IRON AGE

THE NATIONAL METALWORKING WEEKLY A Chilton Publication JULY 6, 1961

★ Saginaw Steering's Doerfner and Godfrey Watch As

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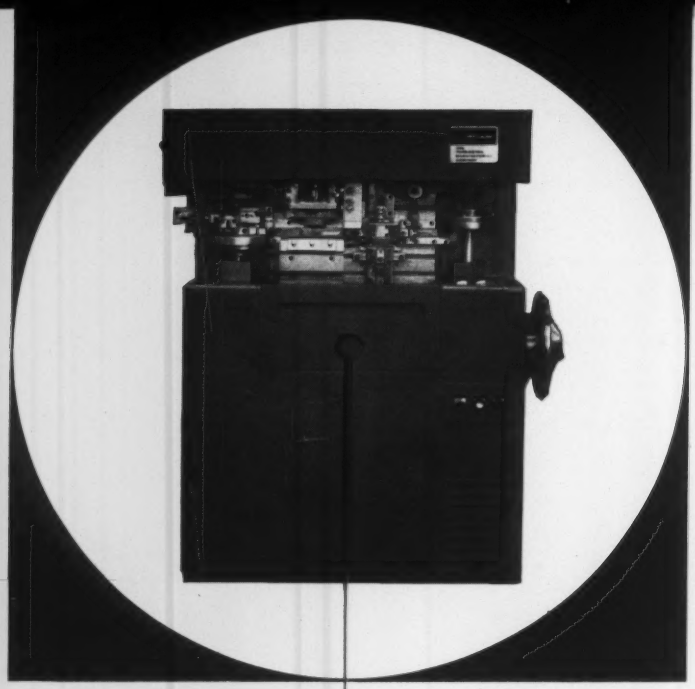
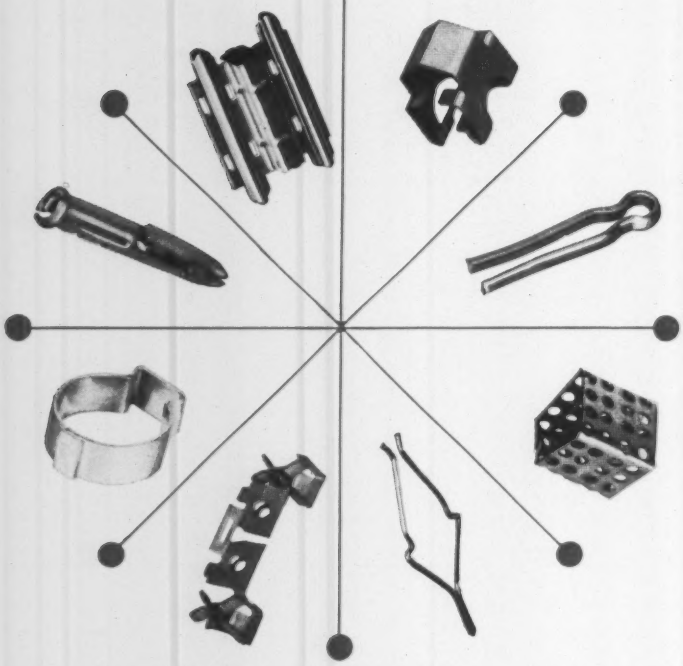


This is the machine

These are its products



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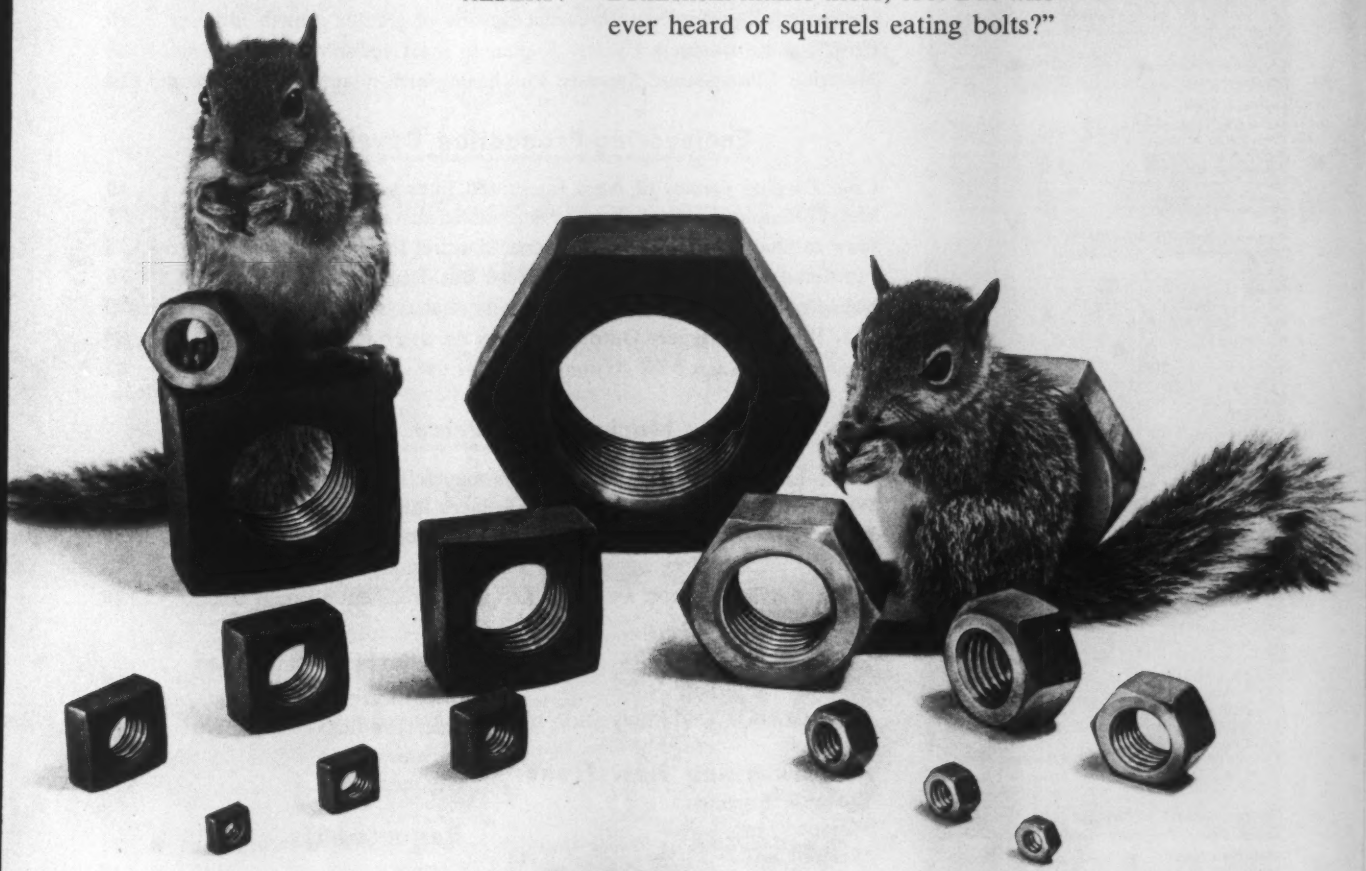
ALBERT: "And they all come from Bethlehem."

PERCY: "But where are the bolts?"

ALBERT: "Bethlehem makes those, too. But who ever heard of squirrels eating bolts?"



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IRON AGE

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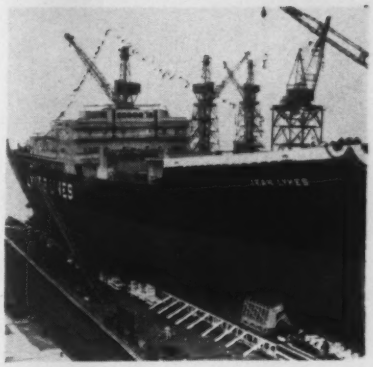
Special This Week

Cold Forging Breaks Design Barriers

The trend toward chipless-forming methods is mounting. In the vanguard is the cold-extrusion process. Early attempts haven't all been successful. However, GM's W. H. Doerfner, general manager, Saginaw Steering Gear Div., and his works manager, J. E. Godfrey (right), report design barriers are broken. p. 69



Shipbuilding: Action After Long Lag

Contracts for new U. S. merchant ships are now at a record peace-time level. Shipbuilders report the Ship Replacement Program of the Maritime Administration, plus normal obsolescence, have definitely improved the outlook. p. 41

Computers Click Toward New Records

Computer sales and rentals will reach $1.5 billion in 1961, another record year for an industry which has never known a setback. By 1970, annual sales will top $10 billion, with 80 pct in markets that don't exist at present. p. 46

Next Week

Productivity Can Be Improved

Dr. R. N. McMurry is familiar to IRON AGE readers. His earlier series on The Problem Employee still draws reader comment. Next week starts the first of an important new management series by Dr. McMurry: How to Improve Worker Productivity.

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Sacrifice for What? And Besides, Who Says So?

There is loose talk going the rounds about the people making sacrifices. There are snide remarks that we like our dishwashers more than we love our country.

These cliches make headlines. But they are not true. No one has told us—except in the most general terms—why we should sacrifice, what we should sacrifice, and how we should sacrifice.

It must be known by those in Washington—and those on the soap boxes—that ours is not a democracy. It is a republic. We elect representatives. They are supposed to use their good judgment. Also, they are supposed to give the people what is best for them.

The President is supposed to be a leader. That's why people elect him. It is up to him to lead, just as it is up to Congress to do what is best for the people—and for the nation. Not to do so is to betray a trust. Some will say this is old-fashioned thinking. But it is still the truth.

Now to the sacrifices. Should the people sacrifice so the farmers can grow less—and be paid for it? Should they pay higher taxes and cut their spending so the rent may be paid on stored farm surpluses?

Should our people go without things so the military brass can waste billions in foolish procurement habits? Are we to live a spartan life so the government can go on and on with its spending binge? A binge, mind you, that has nothing to do with defense.

Should the healthy and the willing carry on their backs foreign aid spending which to date has proved nothing? On the contrary; places where much money has gone down the drain are either lost or "neutral."

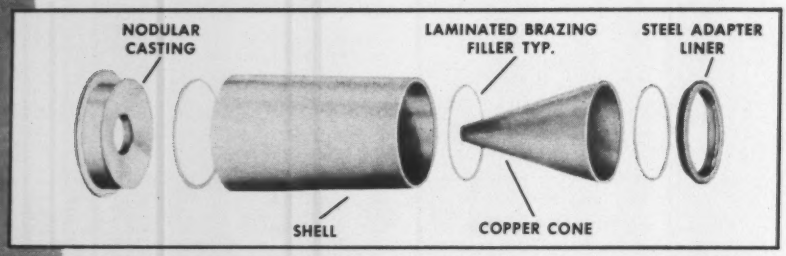
Shall the people learn the habits of hermits so one arm of the World Bank can lend money at no interest with 50 years to pay and the criterion is need—and inability to pay interest? Alongside of this, too, will be loans to those who can pay—with a stiff rate and much less time to repay the loan.

Shall our thrifty citizens shell out in taxes to pay for roads—built with Federal funds—which reek with brazen corruption far worse than any we have seen abroad?

When the honest test for sacrifice comes and when our leaders and Congressmen do their job, the people will follow. They won't follow Pied Pipers no matter what the ghost writers have them say—on or off the soap boxes.

Tom Campbell

Editor-in-Chief



The four components of the nose assembly—nodular iron casting; low-carbon welded steel canister which measures 34" long, 15½" diameter at one end and 17¾" at the other; spun copper cone and low-carbon steel ring. The thinner rings are Easy-Flo 45 wire braided for precise alloy position and control.

Martin Develops New Induction Heating Methods to Braze Lacrosse Missile Assembly With EASY-FLO 45

One of the largest assemblies yet brazed by induction-heating techniques is a section of the Lacrosse missile being manufactured at The Martin Company's Baltimore Division. During development, one problem was posed by the variety of metals used. First it was necessary to braze a low-carbon welded steel canister and nodular iron casting. Then, to complete the assembly, a spun copper cone and low-carbon steel ring were joined to the canister. An induction coil was designed by Martin to accomplish this critical operation. Temperatures had to be restricted between 1300 and 1350°F to prevent a transformation change to the crystalline structure of the nodular iron. Martin's Materials Engineering Laboratory made careful examinations of this assembly and found that Handy & Harman Easy-Flo 45 Silver Brazing Alloy and B-1 Flux make possible the strong, uniform joints necessary to meet the stringent requirements the Company has set. Its low-working temperature, high strength, fast penetration and flow characteristics are only a few of the features which make this brazing alloy ideal.

More and more aircraft and missile components are being made with the aid of Handy & Harman silver brazing alloys and flux. The products described here are just two of the many available to help solve your problems...make your job easier and quicker. For a more complete picture of silver brazing and the advantages it offers you, write for your free copy of Bulletin 20.

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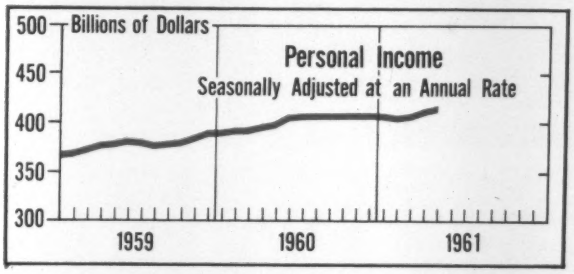
Income Up; Spending Lags

Personal income, seasonally adjusted, rose to a record-breaking $413.7 billion in May, up $2.4 billion from April. Labor income accounted for $1.4 billion of the rise, led by steel and auto payroll rises.

But high income is not the automatic good sign to manufacturers it was in past years. The big job



for consumer durable goods makers is to divert more of this income into spending for products.

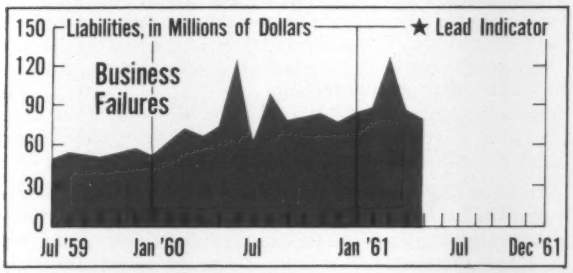
For example, while disposable personal income rose by $10.2 billion from the first quarter of last year to the first quarter this year, consumers spent $5 billion less for durable goods. But service spending rose by $8 billion. And consumers added $4.6 billion to their savings.

So far, in the recovery, consumers are not coming back strongly enough to product buying. And now, they won't be crowding into the stores until the Fall.

Failures Hit Wholesalers

Business failures in May came near to reaching a post-war record. During the month, 1,545 businesses went under. This is a rise of 7 pct over April. And it is second in the number of failures for any post-war month since the high of 1,610 in March.

However, dollar liabilities of businesses that failed



in May dropped to $80.5 million, down from $86.1 million in April.

Casualties among wholesalers hit a post-war high in May. Chief among these were wholesalers of building materials, machinery, and automotive supplies.

A bright note: In May there was more of a shuffle than a shakeout in business. Almost 15,000 new businesses were incorporated. This is the highest level since October 1960.

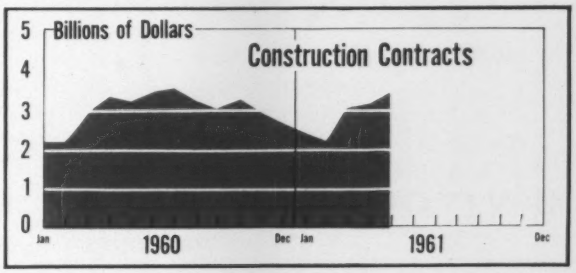
Rail Freight Loadings To Rise

Railroads expect to haul 2 pct more revenue freight in the third quarter this year than in the same quarter last year. This is what Regional Shippers Advisory Boards report to the Assn. of American Railroads. Estimated carloadings for the quarter are 6.1 million.

Estimates for metalworking items. loadings are all up. Here are estimated percentage gains: Iron and steel, 17.1; vehicle parts, 10.8; agricultural equipment, 8.6; autos and trucks, 6.1; metals (other than steel), 1.3; machinery and boilers, 0.9.

Housing Outlook Brightens

May contracts for future construction totaled $3.5 billion, up 5 pct from year-ago figures. Non-residential building contracts at $1.1 billion showed no change from last May business. But residential contracts, at $1.5 billion, were up 7 pct over year-ago business.



And heavy engineering construction, at $842 million, was up 9 pct.

After seasonal adjustment, May levels show a slight decline from April contracts.

The outlook for housing brightened in the data compiled by the F. W. Dodge Corp. A 4 pct rise in contracts for single-family houses was noted. This was the first time in 17 months that housing contracts exceeded year-earlier levels.

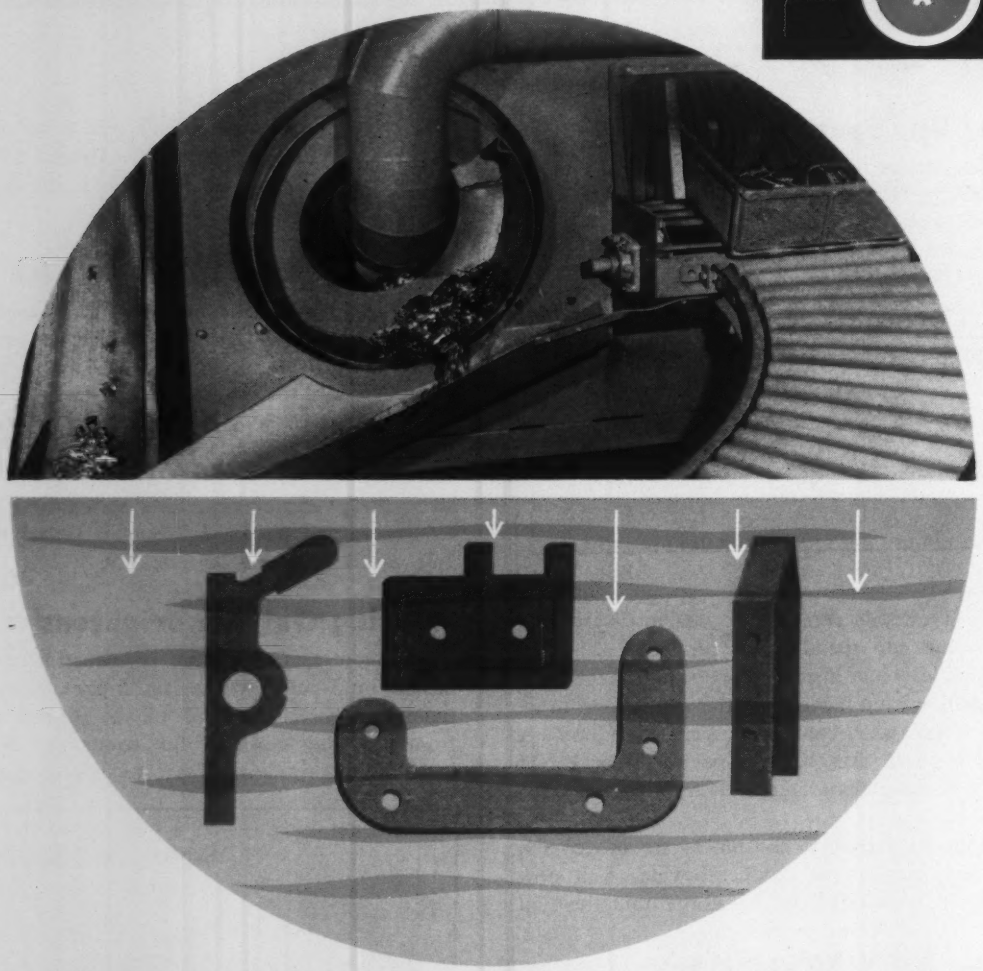
Cost Control Still Important

It won't pay to let up on cost control programs now that orders are starting to pick up. The competition may be among the large number of companies still still knee-deep in cost cutting.

Reports indicate that much of present cost control in the durable goods line is aimed at overhead.

Pennsalt System Approach for better cleaning

EQUIPMENT CHEMICALS



SWITCHGEAR RELAY PARTS CLEANED BETTER

with Pennsalt equipment-chemical team

By turning to Pennsalt for both cleaning equipment and chemicals, the General Electric Low Voltage Switchgear Department in Philadelphia brought new efficiency and product quality to cleaning precision parts used in protective relays for electrical systems.

The machine. A combination Pennsalt drum-belt washer produces "excellent results" on in-plant cleaning of parts. Small parts and contacts are automatically soaked, washed, rinsed and dried in the drum section; larger parts in tote trays receive a spray wash, rinse and hot air drying cycle on the belt side.

The materials. On the basis of our lab evaluation of actual soils and parts to be treated, we selected the Pennsalt cleaners best suited for this job in this Pennsalt equipment: Pennsalt Cleaner 30, an alkaline material that gives fast, effective spray or soak cleaning; and Pennsalt Cleaner EC-54, a speedy, emulsion cleaner that does not boil off or evaporate at high temperatures.

Pennsalt System Approach. Teamwork of Pennsalt chemicals and equipment for metal treatment gives you best finishing at lowest cost. Because we make both, we can make them work together at peak efficiency. And we live with your production line month after month. Work-together combinations of materials and machines from Pennsalt cover a broad range of cleaning, phosphating, drawing lubrication and pickling operations.

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UAW: Contract Talks Get Underway at GM

As 1961 auto contract negotiations began June 28 at General Motors Corp., United Auto Workers president Walter Reuther pledged that everything possible will be done to reach settlements with the Big Three **"without assistance or intervention from Washington."**

GM's SEATON: Team captain?

He expressed optimism over the outcome of negotiations and said his union is **"in an excellent bargaining position."**

Earlier, GM officials warned of inflation as a possible result of **"excessive increase in labor costs."**

In leading off negotiations, GM indicated the path they will follow: Resistance by companies to UAW demands that might lead to much higher production costs and perhaps to higher priced cars.

"We hope to work out a new agreement through free collective bargaining as we've been able to do for the past 14 years," said L. G. Seaton, GM vice president in charge of personnel.

Before negotiations began, Carl Stellato, president of UAW Local 600 in Dearborn, revealed that the Justice Dept. is checking into Big Three "teamwork."

"We will enter negotiations knowing in advance that Ford, GM and Chrysler are working together as a team to deny to their employees their just demands," he said in a signed article in his local's weekly paper.

"In fact," he continued, **"the teamwork between the Big Three is being closely scrutinized by the Department of Justice for possible violations of the anti-trust laws."**

Labor Dept. Gets Industry Executives

Industry executives will be "assigned" to the U. S. Dept. of Labor under a pilot program sponsored by The Brookings Institute. The purpose: "To build understanding between the Federal government and major segments of our society."

Adrian A. Flakoll, management selection and development administrator for the Lockheed Missiles and Space Div., is the first of nine executives to be selected. He is on a 23-week working assignment in the Office of the Secretary to observe "from within" decision and policy-making operations of government.

He is currently assigned to Deputy Asst. Secretary Wolfbein's staff, working on automation and related manpower problems.

Automation Report Issued

House Labor Subcommittee on Unemployment and Impact of Automation, headed by Rep. E. J. Holland (D., Pa.), has issued its report. The majority report (four Democrats, two Republicans) made four recommendations:

First, there should be encouragement and assistance for those unemployed who are qualified and willing to undertake further education.

Second, states should get Federal assistance to expand and improve vocational education programs to retrain workers displaced by automation.

Third, U. S. Employment Service should be beefed up to improve and speed the spreading of job-opportunity information.

Fourth, greater labor mobility should be encouraged, especially among the permanently unemployed or technologically displaced workers.

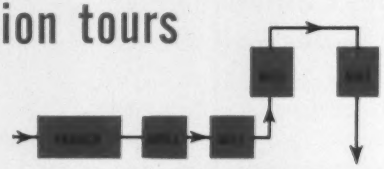
Significantly, the majority doesn't recommend Federal subsidies for the unemployed to encourage them to move to areas with better employment opportunities. This was part of the Administration's manpower retraining and relocation program. (Senate Labor Subcommittee has approved the retraining plan, but killed the relocation subsidy.)

A minority report was filed by Rep. D. C. Bruce (Rep., Ind.) He rejects the call for more Federal participation in the economy. What is needed, he says, is "a total realignment of our tax structure to encourage individuals and corporations" and that this would "provide the hope for real economic growth and strengthening of the fibers of freedom."

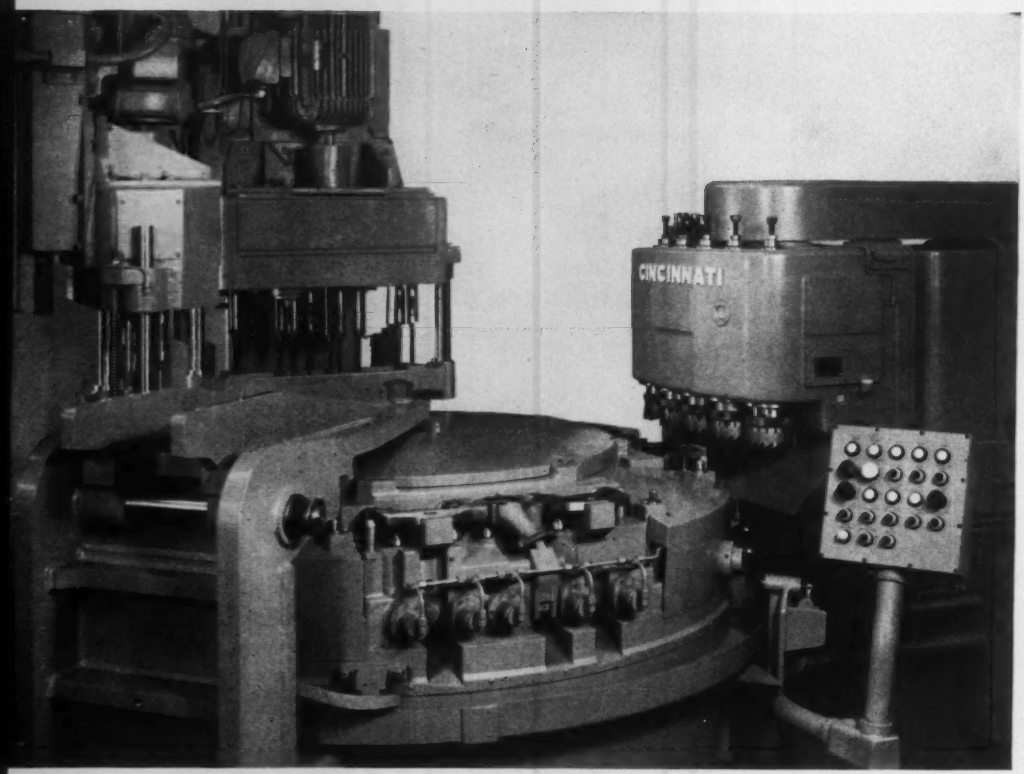
CINCINNATI

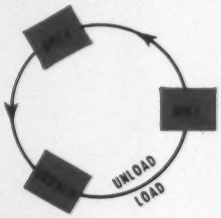
CINCINNATI | SPECIAL MACHINE DIVISION plans and develops low-cost production tours

Straight Line

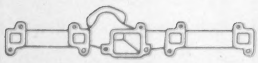


Straight Line and U-Turn





Rotary Index



Milling, drilling and broaching of exhaust manifolds is completed on this CINCINNATI Rotary Index Machine at a production rate of 105 parts per 48 minute hour. Broaching is free, performed during the rapid index segment of the cycle.

PRODUCTION "TOURS" planned and developed by Cincinnati give you a fresh outlook on how low production costs can really be. The work may progress from one operation to the next in a straight line, U-turn or circle.

One giant 36-Station Transfer Line built by Cincinnati automatically machines V-6 and V-12 cylinder blocks. The blocks move through the world's largest broaching machine, then follow a straight line through drilling and milling stations, finally taking a space-saving U-turn through two more milling stations. In another Cincinnati production line, aluminum transmission cases follow a straight path while receiving 33 machining operations. Some types of parts are particularly adapted to a circular production tour. Cincinnati's Special Machine Division has built many machines of this type, some for milling, others for milling and drilling, while still others include a free broaching operation. One example is illustrated above.

Whatever your metalworking requirements, you can be sure that Cincinnati's 47 years' experience in building automatic machines and production lines will result in the lowest production cost and the highest degree of dependability. May we help you? **Special Machine Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.**

CINCINNATI®

SPECIAL MACHINE DIVISION

DESIGNERS AND BUILDERS OF

SPECIAL MACHINES • HORIZONTAL BROACHING MACHINES • COMPLETE PRODUCTION LINES

★ Metals Imports Probed

Efforts to discover if imports can be blamed for the "creeping paralysis of unemployment" in the steel and aluminum industries will be made next week.

A special House labor subcommittee, headed by Congressman John H. Dent (D., Pa.), will hear top industry witnesses in Pittsburgh Monday and Tuesday.

Congressman Dent told The IRON AGE that he believes unemployment problems in the steel and aluminum industry are "connected directly to importation." He says:

"Imports are the main cause of our problem—unemployment. And I hope we can find some answer to this creeping paralysis of unemployment.

"I believe it is consumer goods displacement by imports that is causing most of the problem."

What about the claim that automation is to blame?

"No," he says, emphatically. "The only automation hurting us is the automation in foreign countries. The imported products of this automation are hurting our industry.

"In the tool steel industry, for instance, unemployment is connected directly to importation, not automation."

Top industry executives have expressed a desire to testify before Rep. Dent. Such companies as Pittsburgh Steel, Armco Steel, Latrobe Steel, and Alcoa, among others, have responded.

They will testify on steel and aluminum production, exports and imports in the last 10 years and the changing levels of unemployment in this same period.

These hearings differ from most in that they are not on legislation. But they seek to find what legislation is needed, if any. The outcome will undoubtedly be a bill written by Congressman Dent.

■ Metalworking Areas Among Loan-Seekers

More than 100 applications from depressed areas, several from major metalworking regions, are now being processed by the Area Redevelopment Administration.

The first Federal project under the act is expected to be okayed in less than 90 days. Though most applications are for public facility loans, there are many industrial and commercial project bids.

■ Kennedy Edges in With Lead-Zinc Aid

President Kennedy plans to use administrative action to aid the depressed U. S. lead and zinc industry. He is thinking of having the Govt. buy $60 million of the industry surplus.

It will be quite a while before his program can be implemented, however. Interior Dept. sources point out that the industry and Congress will be queried.

So far, the program has met with mixed emotions. Some believe the plan will up lead-zinc prices as much as two cents a pound and keep failing mines alive. Others say it won't do enough to revive the ailing industry.

The $60 million lead-zinc surplus would go into a Govt. stockpile. The purchase plan would relieve producers, smelters and private metal firms of the surplus lead and zinc accumulated up to Dec. 31, 1960.

Other features include:

1. Setting up an Administration task force to determine how depressed mining areas could be included in the Area Redevelopment Program.

2. Allowing the price of silver to increase in the U. S. to benefit mines which produce silver, lead and zinc in combination.

3. Maintaining a continuing study of the industry.

■ Industry Faces Another Price Probe

Industry faces what amounts to new "administered price" hearings.

The IRON AGE learned that new hearings will come out of the Senate antitrust subcommittee quiet investigation of the relation of "administered prices" in U. S. industries to this country's deteriorating position in world markets.

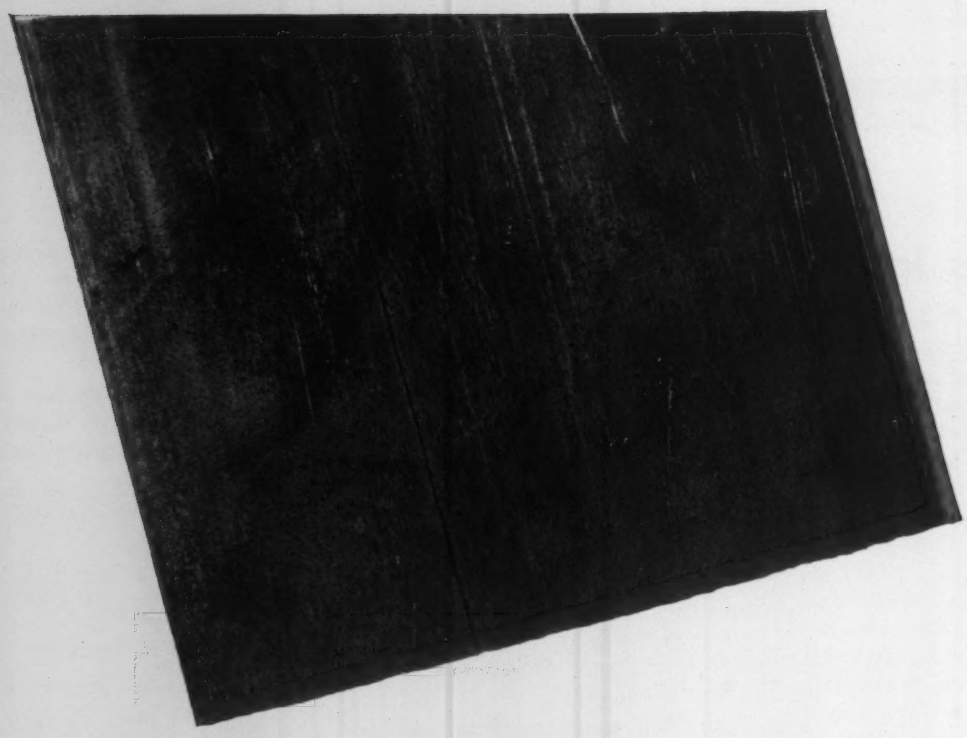
Steel, auto and machinery industries will be at the top of the witness list.

Though investigators say hearings will result from the probe, they can't come until the next session of Congress. The staff, headed by Dr. Walter Adams, Michigan State University economist, won't finish its study until later this year.

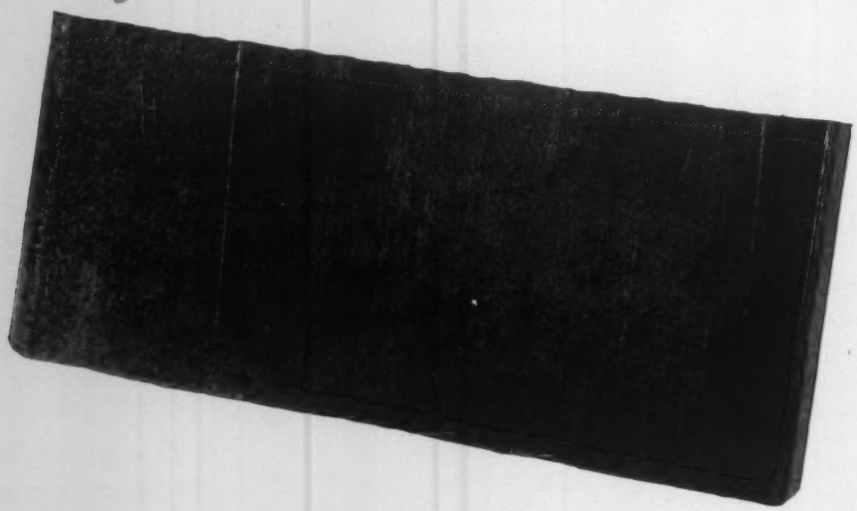
■ Congress Skeptical Of New Department

The Administration plan to elevate the housing and home finance agency to Cabinet status is getting close congressional scrutiny. So far, Congress is not ready to create a Dept. of Urban Affairs and Housing.

The new dept. would coordinate all Govt. housing programs, including Federal financing. It also would take over Federal programs for urban and metropolitan affairs.



the proof is in the cutting



The first cutting stroke of your Nicholson or Black Diamond industrial blade will tell you. Whether you're using a hand hacksaw, power hacksaw or band saw blade, you'll know you're using the finest that modern technology can make.

Each Nicholson or Black Diamond blade gives you a superb edge of precision-made teeth... each blade is made from the finest metal... each blade will give you clean, fast cutting and maximum shop life.

Here's the way to save time and to save replacement costs. Whatever your cutting requirements are, ask your distributor* for a supply of appropriate Nicholson or Black Diamond blades. The proof of blade superiority is in the cutting. He's also ready to suggest the best blade types for your purposes.

* Industrial Distributors provide the finest goods and services in the least possible time. Our products are sold exclusively through them.

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1961: A Record Year for Exports?

There's a good chance that 1961 will finish as a record year for U. S. exports. At least, this will be the case if present activity is any indication of what to expect through the rest of the year.

Last year, U. S. non-military exports to Western Europe climbed 41 pct above the 1960 level to a record $6.8 billion. The Japanese were also big customers. But poor business in Canada, the Cuban situation, and bad times in South America hampered the overall U. S. export picture.

Now, the export pace is quickening. Exports to Western Europe are already running about 12 pct ahead of 1960. Canada is again a major customer, and the Japanese market continues to grow. On top of this, there is renewed interest in U. S. goods in India and Africa.

Most economists look for machinery, aircraft and metals to make big export gains again in 1961. Last year, aircraft exports rose from the 1959 level of $50 million to $375 million. And machinery exports to Western Europe alone climbed 43 pct in 1960.

Crude Aluminum Exports Drop

U. S. exports of crude aluminum continue a downward trend. Latest figures released by the Dept. of Commerce show another decline of overseas shipments in April.

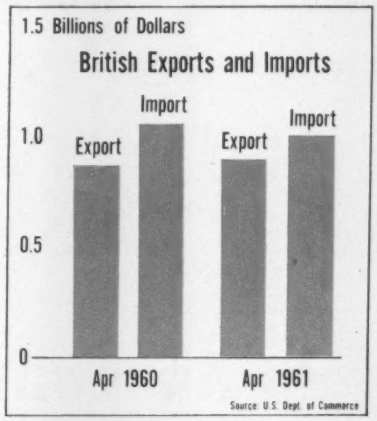
Crude aluminum exports in April totaled 15.9 million lb. This is compared with exports in March of 24.5 million lb. The total of exports for the first four months of this year was 97.9 million lb. The figure for the same period last year was 242.4 million lb.

Scrap aluminum exports also fell during April. Dept. of Commerce says 14.7 million lb were sent abroad in April compared with 16.7 million lb in March of this year.

British Economy Trend Uncertain

The picture painted by the present status of the British economy is a cloudy one.

Nearly all of England's industries are working at full capacity.



Unemployment dropped 1.5 pct during the first quarter. But the production index has failed to rise and Britain's gold reserves are still falling.

Of great concern to British businessmen is the fact that gains in external transactions come from reduced imports rather than greatly increased exports (see chart). United Kingdom exports in April, 1961, rose slightly to a value of $892 million. Exports in March totaled $868 million.

Imports, however, dropped from March's level of $1.17 billion to a value of $995 million in April.

The widely expected rise in production during the latter part of the first quarter never came. Seasonally adjusted, England's production index is still 120 (1954 = 100).

U.K. Automakers Hit by Strikes

Auto production is threatened by labor problems in the United Kingdom.

More than 15,000 workers at the Dagenham plant of Ford Motor Co., Ltd., struck last week. Another 2000 auto workers went on an unofficial strike at the accessory supply plant of Smiths Motor Accessories, Ltd., a few weeks ago.

The Smiths walkout is causing the greatest problems in Britain's auto centers. Auto accessory stocks are said to be dwindling rapidly. Already the Smiths strike has reportedly idled several hundred British auto workers.

Jaguar Cars stopped production at its Coventry plant, and Standard Motor Co. banned overtime work. Workers are also being laid off at Rootes Motors.

European Mill To Go Automatic

Europe will soon have its first steel mill with full-scale automation equipment from the U. S.

Westinghouse Electric International Co. will supply the automatic control system for a new wide-flange beam mill in northeastern France. The mill is slated for completion by late 1962.

The Programmed Digital Automatic Control (Prodac) system is ordered for the mill.

New Trade 'Czar'?

President Kennedy may soon name a foreign trade "czar" to push a reciprocal program through Congress.

The "czar" would be a special assistant to the President with the job of drafting a trade program and getting it through Congress.

Stainless Strip

Vertical Bright Annealing Furnace added to EF Research Laboratory

This vertical furnace, newly installed in our research laboratory, will bright anneal 1500 lbs. per hour of 24″ wide strip at temperatures up to 2100°F. The strip is heated electrically in a hydrogen, dissociated ammonia or other protective atmosphere; is jet cooled prior to discharge; and does not come in contact with rolls in either the heating or initial cooling zones.

This furnace has already made successful production size experimental runs on various analyses of stainless steel trim stock for five large primary steel producers, and is expected to be used for research work on all grades of stainless, also carbon steel and non-ferrous strip.

Our extensive laboratory, completely equipped for processing ferrous, alloy and non-ferrous materials, is available to all metal producers and processors for their development and research. Feel free to use it frequently!

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SALES REPRESENTATIVES—2842 West Grand Blvd., Detroit 2, Mich. • also 968 Coleman Rd., Cheshire, Conn.

Curbs Copper Smut

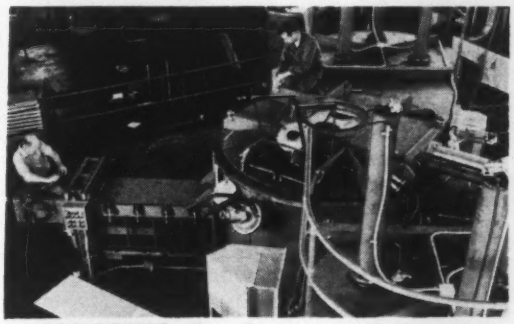
For years, engineers have been baffled by the appearance of a copper deposit on pickled steel plate. This smut formation can cause galvanic corrosion. It can also hinder paint performance. One shipyard solves the problem by testing the pickling solution at the middle and end of each shift. If copper plating is noted, set amounts of diethylthourea are added to the bath.

Aluminum-Corrosion Test

Ford Motor Co. has developed a new test to determine the corrosion resistance of anodized-aluminum trim. This test gives results in minutes. Here's how it works. A small electrolytic cell containing a corrosive agent is placed in contact with the trim surface. The resistance to a mild electrical current is then gaged during a brief accelerated-corrosion period.

Electron-Beam Furnace

Electron-beam melting is going into large scale production. Standing three stories tall, a new metallurgical furnace is rated at more than a million pounds per year capacity. It's slated to handle stainless steel and refractory metal ingots. Weighing 25 tons, the newcomer will turn out 20-in. diam x 6-ft long ingots.



TOP LEVEL: Two floors are underground.

Forms 200 Cans a Minute

A major aluminum producer is installing an extrusion press that's designed to make 200 beer cans per minute. Presses now in service have a top speed of 120 cans a minute. The new installation solves high-speed discharge problems.

Withstands Big Bang

Aluminum armor plate passed the "acid test" last week at the Army's Aberdeen Proving Ground. A 37-mm high-explosive shell was fired directly at the weld in an aluminum plate. Upon explosion, the impact left a grisly pock-mark; but the round didn't penetrate the plate. This tough nonferrous plate boasts many advantages. It keeps weight down, resists corrosion and is easy to fabricate in the factory or in the field.

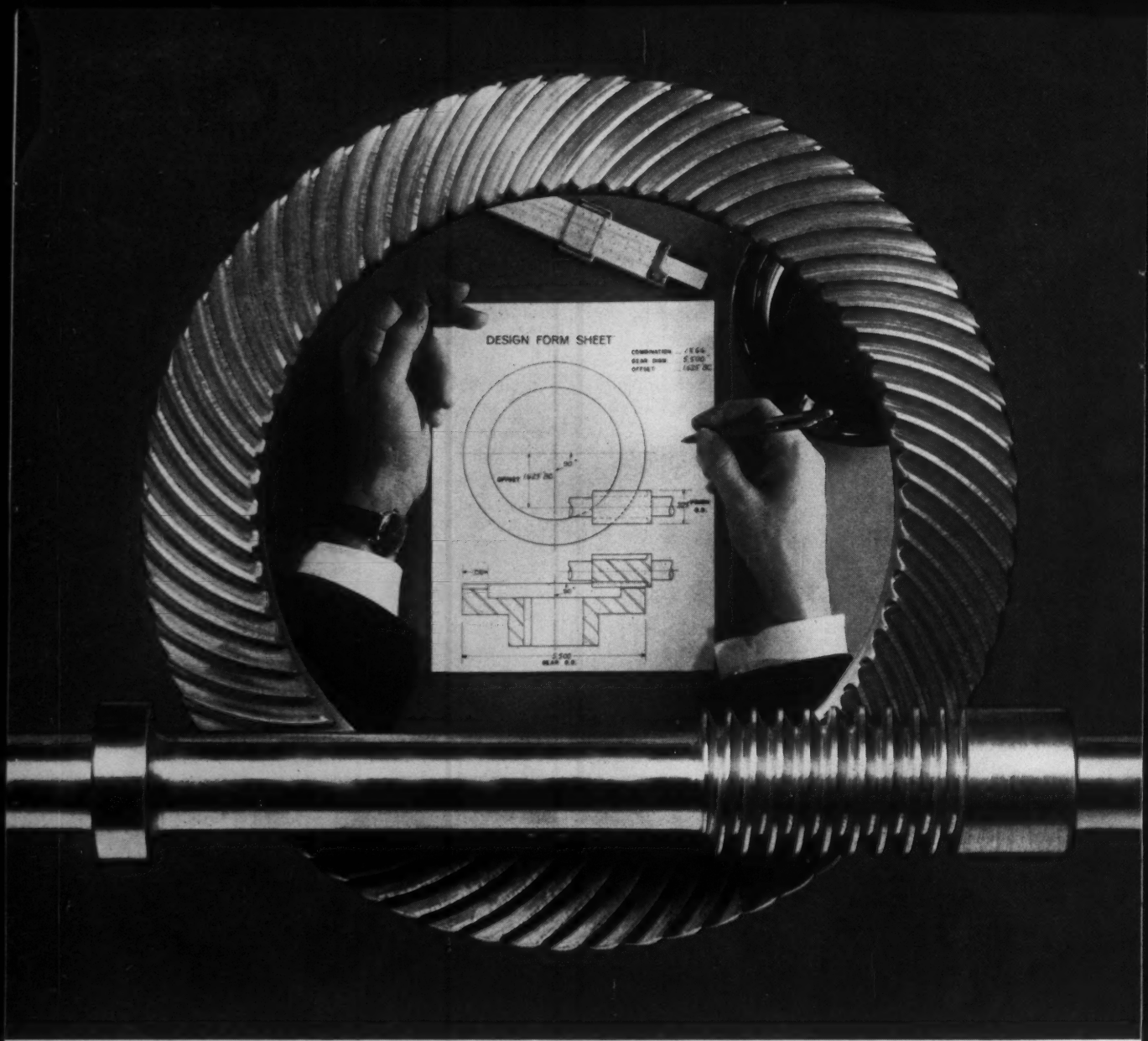
LIGHT ARMOR: Nothing came through.

Lightweight Engine Block

Automakers are working hard to come up with more uses for light-mass irons such as malleable iron, ductile iron, nickel-containing iron and other iron alloys. Under study at several companies are engine blocks made of ductile iron. The goal is to obtain thin-wall blocks which are as strong as gray iron. A key drawback involves lack of equipment, especially sand molds.

Selective Cleaning

Freon aerosol propellents have been put to work in a new series of automatic cleaning machines. These Du Pont solvents boast high volatility, good selectivity, ease of recovery and excellent penetrating and cavitating properties. Nonflammable and nontoxic, they remove both dirt and grease. And they're so safe they can even be used to clean delicate precision instruments.



Why it will pay to design your high reduction gearing with Gleason HRH*

If you want to make your transmission more quiet or more compact or more flexible, take a good long look at the HRH set shown above.

This single set of gears gives a reduction of 66 to 1.

The action is quiet and smooth and continuous because the pinion teeth *wrap around* the gear teeth. With this design you can work such quiet operation into your designs even with a one- or two-tooth pinion member.

You can add the rigid support of a straddle mounting, since bearings can be put on both ends of the pinion.

HRH gear ratios are made with proven face mill cutting techniques, assuring complete control of tooth contact pattern to compensate for any assembly or operating condition.

HRH gear ratios are designed with the *full* assistance of all Gleason engineering services. We work with you on the practical design aspects and carry through to the development of prototypes. Then we furnish both machines and tooling for full production—*without royalties.*

Find out what HRH gearing can do for your transmissions. Send for our design form sheet and then send us the gear ratios and sizes you want. We'll send back detailed recommendations promptly.

*Trademark for Gleason High Reduction Hypoids

GLEASON WORKS

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91

LETTERS FROM READERS

Rule By Fear

Sir—Reference is made to your editorial "Rule By Fear: We Are Facing It" that appeared in the June 22 issue of The IRON AGE. You should send reprints of this editorial to every congressman and senator, plus all other important political men you could think of. I am of the belief that there is a certain percentage of them who are honest and sincere.

I have been in the field as a manufacturer's representative, distributor, and engineer for the past 15 years. The General Electric Co., I am proud to say, is one of my best accounts. By "best" I do not say I have made my big dollar volume in sales to them, but they are tops when it comes to accepting new ideas, new products, and new ways to improve their products. They are always receptive to any vendor who can help the company put better products at the lowest possible dollar figure on the market.

It further would be the absolute complete crime against the free rights afforded us by our Constitution to force GE into bowing to the demands of the know-nothings who are attempting to enforce the "rule by fear."—B. J. Small, United Machinery Sales Co., Chicago.

Most Beneficial

Sir—After reading the June 8 issue of IRON AGE, I located an article that would be most beneficial to one of the areas in our operation. The title of this article was "How to Step-Up the Efficiency of Assembly Line Operations." I would certainly appreciate receiving copies of this article at your earliest convenience.—L. E. Simon, Hycon Manufacturing Co., Pasadena, Calif.

■ **The reprints are on the way.—Ed.**

Negative Attitude?

Sir—Try as you did, you did not do a good job of concealing your negative attitude toward foreign aid in your June 8 editorial ("South American Test: We Are About to Face One"). The United States can't refuse to give foreign aid any more than the richest man in town can refuse to contribute to the Community Chest.

Your irresponsive attitude is what President Kennedy suggested we could do without. This is part of the self-restraint he feels is in the national interest — something those who deliberately misconstrue his statements cannot understand.

Let's all contribute to a more positive attitude!—Walter Johnson, Milwaukee, Wis.

Wrong Size

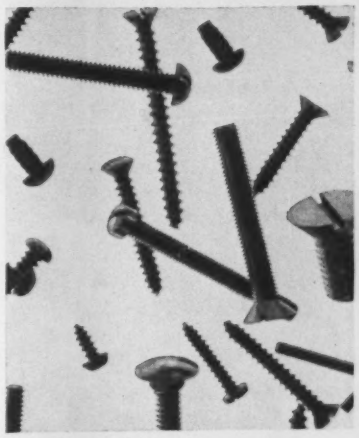
Sir—We are always pleased to see our new products grace the pages of The IRON AGE. Unfortunately, the size capacity of the new Stereopoint gage as printed on p. 162 of the June 22 issue is in error.

The gage is capable of checking a .010-in. hole and not 0.0001-in. as reported. — Charles G. Nobis, The Sheffield Corp., Dayton, O.

"Don't get your hopes up, but I dislike the idea of doing business with you a little less than I used to."

STANDARDIZE 100% ON SOUTHERN FASTENERS

Southern SPECIALIZES in



Standard Fasteners for METAL

When you specify Southern fasteners, you are adding quality to your products and speed to your assembly operations. Southern Screw is a specialist in plated or plain USA-made standard fasteners for the metal industry. This means dependable quality and reliable service with every order. Buying from Southern also means that your "specials" may be a standard stock item in Southern's 1,500,000,000-piece supply at the Statesville, North Carolina plant.

Write for and examine Southern Screw's current Stock List. Then see what 15-year specialization in making quality fasteners can mean to you. Address: Southern Screw Company, P. O. Box 1360, Statesville, North Carolina.

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WAREHOUSES:
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The demands of modern living are nowhere more dramatically reflected than in the increasing demand for iron and steel products, and we are proud to be helping to meet that need. Our products include malleable pipe fittings and iron castings; ductile cast iron for use in crankshafts, camshafts, sprocket wheels, etc.; cast iron and steel parts for rolling stock, automobiles and rolling mills; forged steel parts for industrial machinery (rotor shafts, thrust shafts, counter shafts, axles, gears, rollers, etc.); machine tool steels, high speed steels, stainless and other special steels. We are the largest manufacturers in Japan and have exported the above products all over the world.
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Ready for Bull Run

Unless you look closely at the modern power lines in the left of the picture, below, it could be an actual photograph of Civil War artillery.

Actually, it's a preview of the use of the rare cannon for the reenactment of the Battle of Bull Run this July 22 and 23.

The firing was done by The Hampton Legion, Doylestown, Pa., a reactivated unit of a famous South Carolina command in "The War Between the States." The Legion's authentic 12-pounder was cast in Memphis in 1862.

300 Rounds — But the cannon balls, some 300 of them, were made by the Alan Wood Steel Co. The test firing, here, was on Alan Wood property at Conshohocken, Pa.

The next firing will be at the scene of the First Manassas, or Bull Run, at Manassas, Va. at the reenactment of the battle. Incidentally, chains for the cannon were made by another familiar metalworking company, the Campbell Chain Co., York, Pa.

At the protected site on Alan Wood property, six rounds were fired from the cannon. It was the first time since Civil War days that it had been fired with cast iron cannon balls. The hollow balls donated by Alan Wood weigh 6.5 lb each.

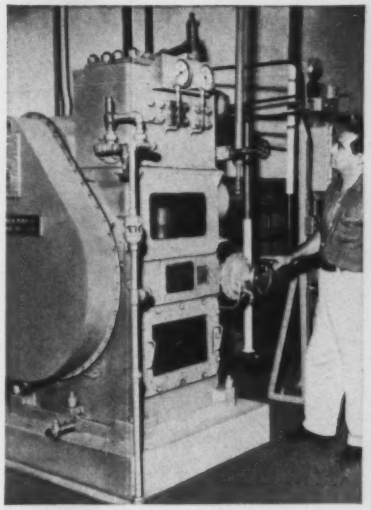
Suggestion Box

We've been exposed to so many bad jokes about suggestion boxes that we're happy to pass on an authentic suggestion box story with a happy, and profitable, ending. Apparently the boss really does read the suggestions.

The story concerns John Washko, an employee at the Ford Motor Co. assembly plant at Wixom, Mich. Mr. Washko is $6000 richer for suggesting a quarter-inch hole.

A plumber-pipefitter, he suggested that a small hole be drilled in the underbody of the Thunderbird. The strategically-placed hole permits rust preventive solution to drain back into the dipping tank for reuse.

FIRE! Civil War cannon is fired as preview of Bull Run reenactment. Cannon balls were manufactured and donated by Alan Wood Steel Co.



13 years...no downtime... no pressure deviation

For thirteen years, at RCA Victor Mexicana in Mexico City, this Aldrich-Groff Powr-Savr Pump has been delivering without a single unscheduled shutdown. Hydraulic presses are fed a water-oil emulsion at a steady 1800 psi. Pump provides stepless straight-line capacity control from zero to rated output. Pressure adjustment is automatic. Constant pressure has been maintained; any variation would have hiked reject rates. Accuracy and dependability of this calibre have enabled consistently high product quality, full production, maintenance of stringent delivery schedules.

You may need the un-ordinary performance an Aldrich-Groff variable stroke pump can give you. Write Aldrich Pump Company, 8 Pine Street, Allentown, Pa., for pump data or assistance in specifying— 5 to 2500 hp, up to 50,000 psi. At any rating, Aldrich Pumps are tough because . . .

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ALDRICH

Bendix SYSTEM-ENGINEERED Numerical Controls log 450,000 hours—with less than 5% downtime

The impressive number of hours logged by machines operated by Bendix® numerical control systems is just one index of leadership in the new era of metalworking. Even more significant is the downtime record. Reports from 30 users show that downtime ranged from 1% to 10%, with an average of slightly less than 5%. Persuasive figures on the practicability of Bendix numerical control systems.

Bendix training and service contribute markedly to maximum machine utilization. Immediately prior to delivery of the machine tool, Bendix trains user personnel who will supervise, operate, and maintain the equipment. When the machine tool is installed, Bendix field men aid in the initial set-up. To assure quality service, Bendix maintains a competent field organization in branch offices throughout the country.

Bendix works closely with machine tool builders. And our numerical controls are *system engineered* to specific applications. Case histories prove that Bendix controlled systems cut production costs, reduce lead time, increase machine tool efficiency, and make parts of consistently high accuracy.

When you consider numerical controls—feasibility, installation, operation—call on Bendix. Investigate our complete line of control systems, both contouring and positioning. Let us explain our proved design techniques, including modular construction, transistorized plug-in circuitry, linear and rotary feedback devices, and high performance servo devices. Find out how Bendix can help you make new profits in metalworking. Write today.

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COMING EXHIBITS

Western Plant Maintenance & Engineering Show—July 18-20, Pan Pacific Auditorium, Los Angeles. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17.)

National Chemical Show—Sept. 5-8, International Amphitheatre, Chicago. (Chicago Section, American Chemical Society, 86 E. Randolph St., Chicago 1.)

Industrial Building Exposition — Sept. 25-28, New York Coliseum.

MEETINGS

JULY

Cast Iron Pipe Research Assn.—Annual meeting, July 26-27, Seaview Country Club, Absecon, N. J. Assn. headquarters, Prudential Plaza, Suite 3400, Chicago.

AUGUST

American Astronautical Society—Fourth western regional meeting, August 1-3, Sheraton-Palace Hotel, San Francisco.

Personnel Management Conference—Cornell University's New York State School of Industrial and Labor Relations, August 1-4, Ithaca, New York.

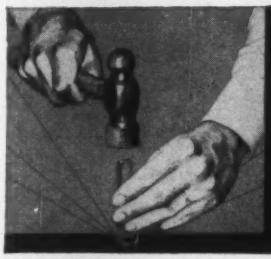
Metallurgical Society of AIME—Semiconductors conference, Aug. 30-Sept. 1, Ambassador Hotel, Los Angeles. Society headquarters, 29 W. 39th St., New York.

SEPTEMBER

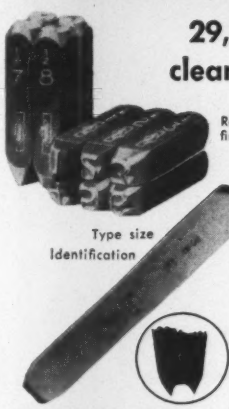
Air Moving and Conditioning Assn., Inc.—Annual meeting, Sept. 10-14, The Greenbrier, White Sulphur Springs, W. Va. Assn. headquarters, Guardian Bldg., Detroit.

International Industrial Conference—Sept. 11-15, Masonic Memorial Auditorium, San Francisco.

(Continued on P. 22)



Specify PANNIER STEEL STAMPS for a longer life of CLEANCUT MARKING


Rounded corners for finger comfort
Rounded head distributes impact, reduces mushrooming.
Type size Identification
Added metal in Pannier fillet increases durability. Correct bevel gives clearer impression, longer life. Outside bevel longer than inside for protection of character face.

29,335 hammer blows—and still marking cleanly—Pannier Letter and Number Stamps

Made of the finest tool steel and correctly heat treated for best combination of hardness and toughness, Pannier single character stamps can take it! Scientific shaping and accurate engraving insure a long life of good, clear impressions. Available in letters, figures and special symbols, and in light, medium or heavy duty design.

Extra tough steel forging stamps for hot or cold, heavy duty marking

For stamping names, part or patent numbers, trade marks and similar markings, Pannier forging stamps are made in four styles:—Hand-style, fullered for wire handle and wood handle style with eye parallel or perpendicular to lettering. All are designed and heat treated for clear impressions and long service. All are covered by the Pannier Master Marker guarantee.

An easy, half-turn flip for Roto-Lok releases any or all of the steel type for fast change. A reverse flip locks them in perfect alignment.

Supreme-Safe Holders with "Roto-Lok" for quick, easy number change

Roto-Lok makes this Pannier Master Marker a time saver in number change and makes serial number marking fast and efficient. The hardened anvil at the base of the type slot keeps type in perfect alignment for equal impression. Machined from bar tool stock, the Supreme-Safe Holder has a heat treated striking head. Both anvil and striking head are replaceable for longer life of the holder itself. Made in hand or wood handle styles, for hot or cold marking.

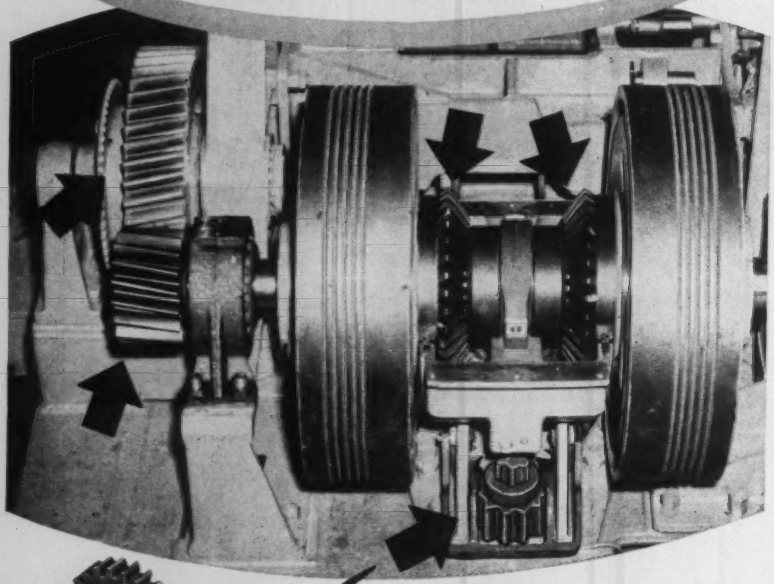
Write for literature

PANNIER MASTER MARKERS

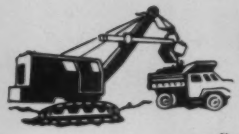
247 Pannier Building, Pittsburgh 12, Pa.

MASTER PANNIER MARKERS

Do You have requirements for "Special Gears?"



CHECK with FAIRFIELD!



"Fairfield has furnished us with bevel and spur gears for many years and we are highly satisfied with their product," states one of America's best known makers of shovels, cranes, and draglines in referring to the above picture. Each gear (*see arrows*) is precison produced to match this builder's specifications for *plus value* quality.

Making gears to meet exacting specifications is our business. The special or unusual requirements you have for design, size, finish, tolerances, materials, and heat treatment are often "standard" at FAIRFIELD. Here, every facility needed is available for production of fine gears EFFICIENTLY, ECONOMICALLY. *LARGE or SMALL, your inquiry will receive prompt attention.* CALL or WRITE.

FAIRFIELD MANUFACTURING CO., INC.
2319 South Concord Road • Lafayette, Indiana
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Gears and Differentials Made to Order for:

TRACTORS • HEAVY DUTY TRUCKS • AGRICULTURAL MACHINERY • POWER SHOVELS AND CRANES
MINING MACHINES • ROAD GRADERS • BUSES • STREET SWEEPERS • INDUSTRIAL LIFT TRUCKS

MEETINGS

(Continued from P. 21)

Society of Plastics Engineers, Inc. —Regional Technical Conference, Sept. 12, Central Indiana Section, Severin Hotel, Indianapolis.

Non-Ferrous Founders' Society—Annual meeting, Sept. 17-21, Shawnee Inn, Shawnee-on-the-Delaware, Pa. Society headquarters, University Bldg., 1604 Chicago Ave., Evanston, Ill.

AEC Welding Forum — Annual meeting (classified), Sept. 20-22, Southwest Research Institute. Institute headquarters, Granada Hotel, San Antonio, Texas.

Industrial Electronics Symposium —Sept. 21-22, Bradford Hotel, Boston. Institute headquarters, 51 East 42nd Street, New York 17.

Pressed Metal Institute — Annual meeting, Sept. 24-28, The Grand Hotel, Point Clear, Ala. Institute headquarters, 3673 Lee Rd., Cleveland.

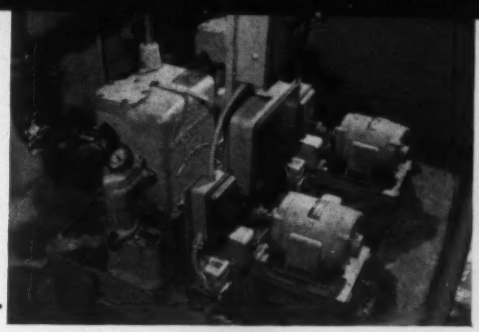
American Welding Society — Fall meeting, Sept. 25-28, Adolphus Hotel, Dallas, Texas. Society headquarters, 33 W. 29th St., New York.

Assn. of Iron and Steel Engineers —Annual convention, Sept. 25-28, Penn - Sheraton Hotel, Pittsburgh. Assn. headquarters, 1010 Empire Bldg., Pittsburgh.

American Die Casting Institute Inc. and The Die Casting Research Foundation—Annual meeting, Sept. 27-28, Edgewater Beach Hotel, Chicago. Institute headquarters, 366 Madison Ave., New York.

American Production and Inventory Control Society—Annual national conference and technical exhibit, Sept. 28-29, Pick-Congress Hotel, Chicago. Society headquarters, 330 S. Wells St., Chicago 6.

Purchasing Agents Assn. — 14th Pacific Inter-Mountain Conference, Sept. 29-30, Westward Ho Hotel, Phoenix, Arizona.



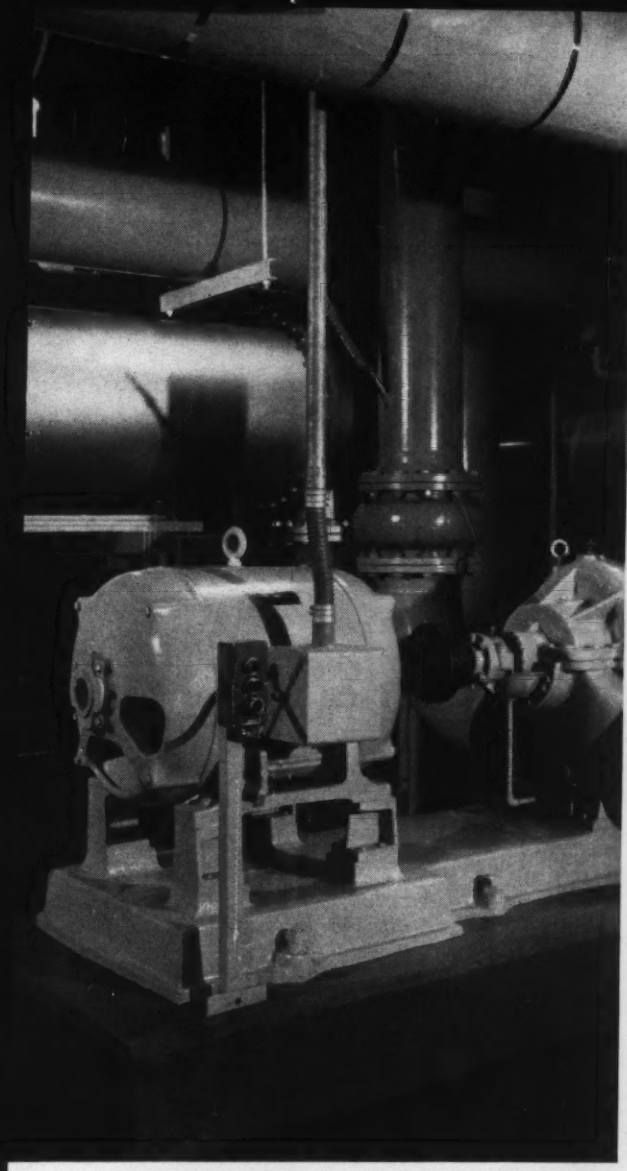
1.

CENTURY MOTORS ARE RIGHT FOR ANY PUMPING JOB

There is a service-proved Century motor for almost every industrial pump application — for centrifugal pumps, condensate pumps, chilled water pumps, reciprocating pumps and many more. Dependable Century motors have been performing outstanding pumping service for years in industrial plants, on farms, in power plants, in heating and air-conditioning units, and on hundreds of other demanding pumping applications.

Century motors have the precise speed regulation important in pumping. And they are exceptionally well protected against dirt, dust, and the severe moisture conditions frequently found in most pump applications.

Century standard squirrel cage motors are shown on this page on typical pump applications at Exchange Park, Dallas, Texas' completely air-conditioned "City within a City".



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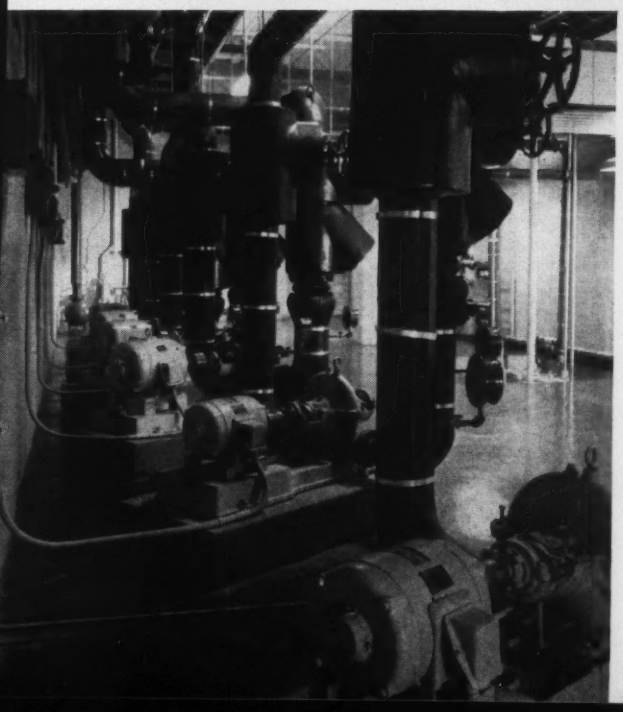


3.

1. **Duplex condensate pumps driven by two Century squirrel-cage 5-horsepower motors. Pumps are in a pit where dust and dirt make motor ruggedness important.**

2. **Century 75-horsepower squirrel-cage motor drives a condensate water pump.**

3. **Six chilled water pumps driven by a series of two Century 5-horsepower motors, two 15-horsepower motors and two 20-horsepower motors are in the power plant of this large commercial development site.**

Century motors on these three pump applications have been operating for years without service or maintenance problems — proof of Century motor dependability.

Century Electric application engineers have years of experience in applying the right motor to your job. Contact your nearest Century Electric sales office or authorized distributor for more information about dependable Century motors.

CENTURY ELECTRIC COMPANY

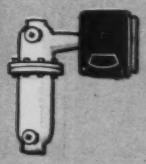
St. Louis 3, Missouri *Offices and Stock Points in Principal Cities*

Century

60-11

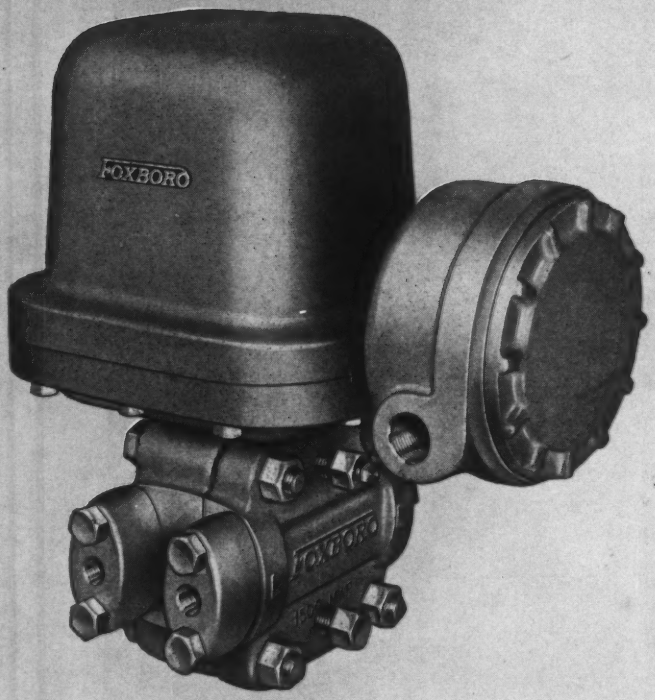
Indicating Motion-Balance Transmitters
...for flow, pressure, and level

Thermocouple and Resistance Bulb Converters
...magnetic amplifiers
...no vibrators
...no mechanical rebalancing



Displacer Level Transmitters
...force-balance for simplicity

Control Valves
...with electro-pneumatic and electro-hydraulic actuators



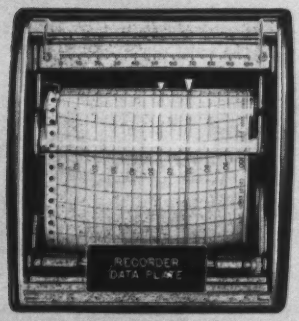
FORCE-BALANCE TRANSMITTER
The Electronic d/p Cell* Transmitter measures flow, pressure or level and converts to d-c signal. Amplifier, shown here integrally mounted, may be separately mounted in an accessible area. Combines the simplicity, sustained accuracy and repeatability of force-balance measurement with the speed and convenience of electrical transmission.

*Reg. U. S. Pat. Off.

FOXBORO Electronic

REG. U.S. PAT. OFF.

CONTROLLER
Electronic Consotrol Controller concentrates all control and supervisory functions in one slim 3 x 6 inch case. Operation is entirely independent of recorder; but both may be enclosed in a single 6 x 9 inch housing with independent pull-out.



RECORDER
Electronic Consotrol Recorder (shown ¼ actual size) uses the simple, powerful Dynatorque pen motor which can be operated directly from transmitter signal without amplification. Available in 1 or 2 pen models.

for the first time... the 100% solid state electronic system!

- choice of force-balance and motion-balance transmitters
- thermocouple and resistance bulb converters-using magnetic amplifiers
- long time-constant tubeless controllers

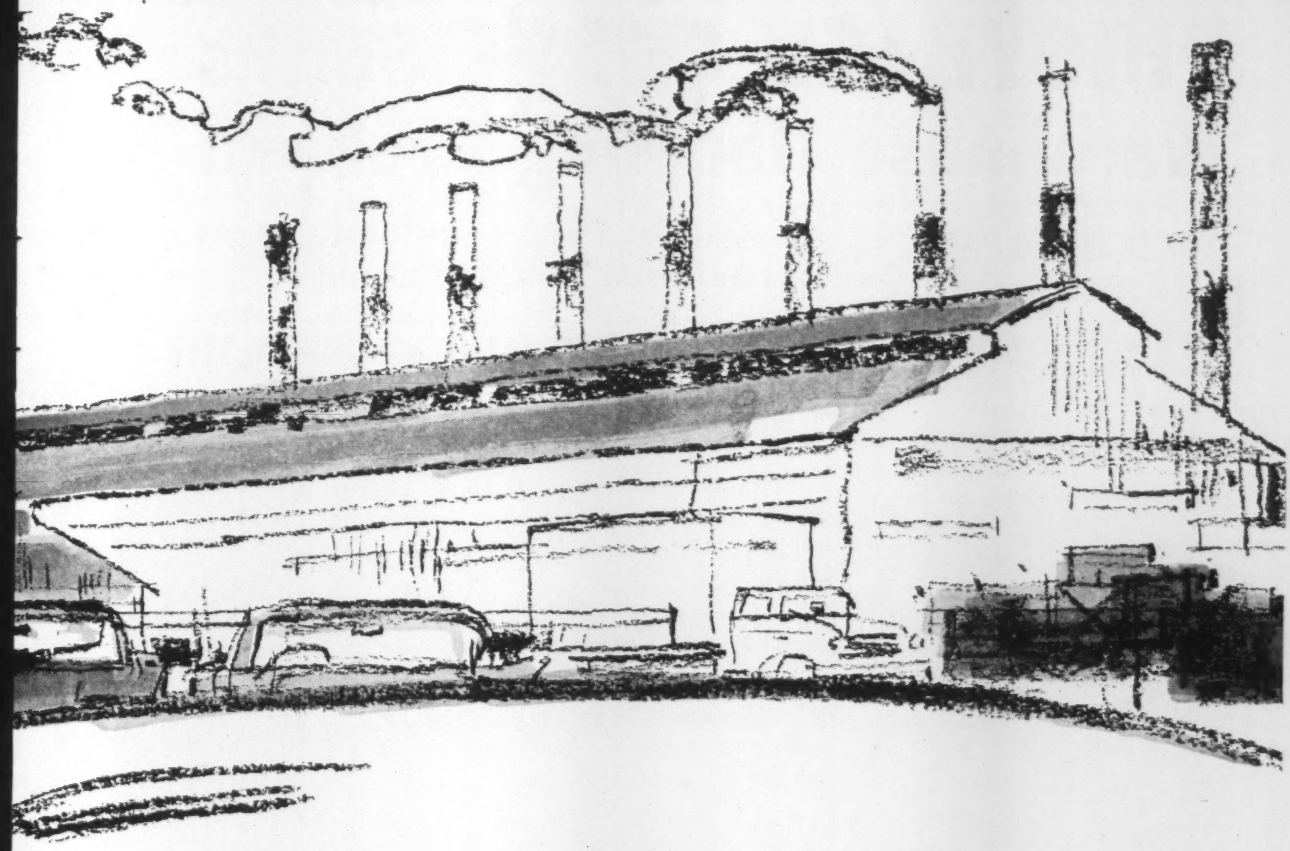
Consotrol Instrumentation

Electronic Consotrol* Instrumentation—the most complete and advanced family of electronic-operated measurement and control instruments available today! That just begins to describe Foxboro's dramatic new advance in instrumentation. ✓ ✓ ✓ Foxboro electronic transmitters, indicators, recorders, control stations, computing stations, valve actuators and other final operators cover every function in the control loop. All are linked by a d.c. current signal. All are completely tubeless. Even thermocouple and resistance-type systems no longer require vacuum tubes. ✓ ✓ ✓ Electronic Consotrol systems convert temperature, pressure, flow, level measurement, etc., to a proportional signal at the transmitter. Transmission to a remote control station is instantaneous—using an electronic motion-balance or force-balance transmitter. Designs are available for both accessible and inaccessible areas. ✓ ✓ ✓ Electronic Consotrol Instrumentation heralds a whole new era in control engineering. Write Foxboro today for 32-page Catalog 21-10 which gives full details. The Foxboro Company, 807 Neponset Ave., Foxboro, Mass., U.S.A.

*Reg. U.S. Pat. Off.

"Foote says Electromanganese will reduce our breakage claims . . . and lower our processing costs at the same time!"

"I don't believe it, but let's let them prove it!"



We'd welcome the chance! Because we've seen it work for so many other steel producers. They've found that Foote Electromanganese®, 99.9% pure electrolytic manganese metal, improves ductility . . . provides finer deep-drawing qualities for *their* customers, cuts down claims and rejects.

As for lower processing costs, these same producers have slightly higher ingot costs, in some cases, but realize savings in less furnace time, less annealing time, less rolling time.

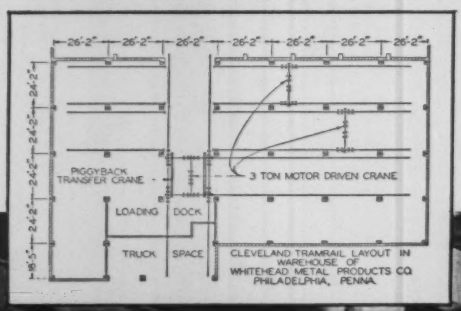
Of course, the reason behind these savings is the fact that you start with fewer impurities in the ingot. Electromanganese gives you true *pin-point control* of carbon, silicon and phosphorus—enabling you to begin and end with a superior product, and greater customer satisfaction.

Let us prove it to you! Foote metallurgists will survey your problems and processing procedures, then recommend a positive solution. If you have specific quality problems in aluminum-killed, rimming, free-machining or stainless steels, now is the perfect time to test this economical solution. Write for full information, and ask for your copy of Bulletin 201, which tells all the advantages of Foote Electromanganese. Foote Mineral Company, 438-18 West Chelten Ave., Philadelphia 44, Pa.

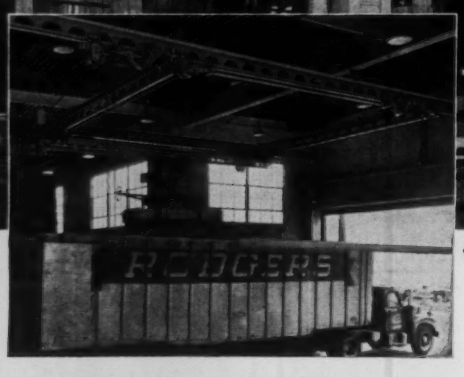
FOOTE
MINERAL COMPANY

PIGGYBACK CRANE Solves Warehouse Handling Problem

Carries Load-Handling Cranes Between Building Columns



Piggyback crane carrying a single-girder crane, which in turn is transporting a case of aluminum sheets with sheet grab. All cranes are 3 ton capacity and motorized. They are easily operated by one man.



Piggyback crane with loaded single-girder crane over truck at loading dock.

THE many regularly spaced building columns in the warehouse of Whitehead Metals, Inc., Philadelphia, posed a tricky problem for the economical handling of flat cases of sheet metal and rectangular crates of pipe and tube, and the multitude of odd shaped cases carried by this metal distributor.

Overhead materials handling equipment was desired because of inherent advantages; such as, enabling maximum use of floor area for storage, higher piling, elimination of serious truck damage to floors and low cost of maintaining overhead equipment. It was also desired that the handling equipment provide complete floor coverage and be as efficient an arrangement as possible.

Cleveland Tramrail engineers solved the problem by designing a special double-girder piggyback transfer crane. This operates on a runway that extends the width of the building and over the loading dock. Single-girder cranes on right-angle runways can be transferred with their loads onto the piggyback and carried to any right-angle runway or directly over a truck at the loading dock. This makes possible fast, easy conveyance of materials between all points covered by the Tramrail system.

This is only one of thousands of unusual handling problems solved by Cleveland Tramrail engineers. No matter how simple or complex your problem is, we recommend that you call Cleveland Tramrail early in your planning.

Write for free booklet No. 2008

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 4855 E. 290 ST. • WICKLIFFE, OHIO

MITSUBISHI INNOCENTI CWB

milling boring and combined machine

Universality, productivity and easy handling....

are characteristics of INNOCENTI-CWB milling, boring and combined machine.

MITSUBISHI ZOSEN (Mitsubishi Shipbuilding & Engineering Company) manufacture and distribute the FA 140/95 type (dia. of spindle 140 mm for milling, and 95 mm for boring) of this universally-known machine, licensed by INNOCENTI S.G. of Milano.

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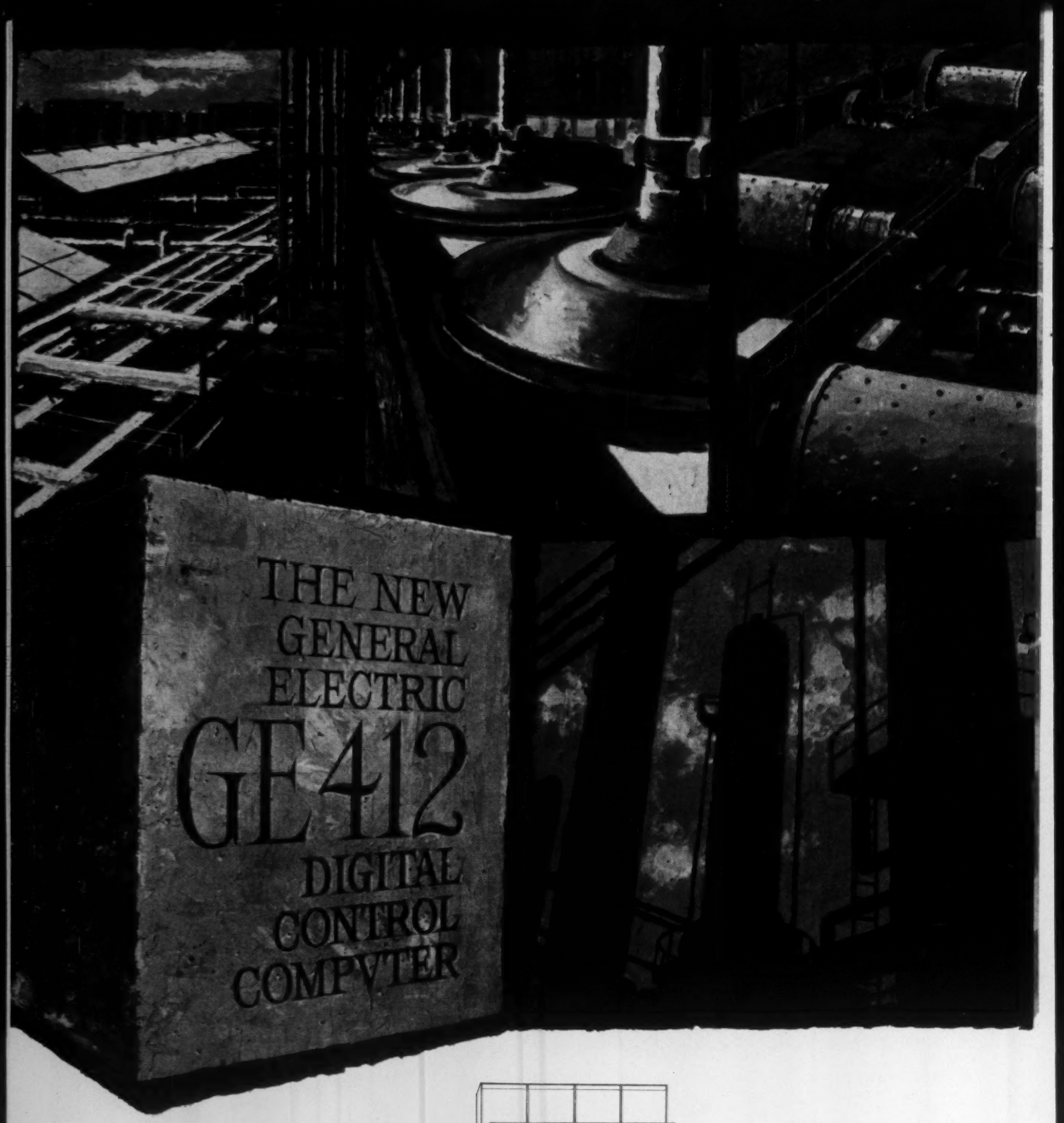
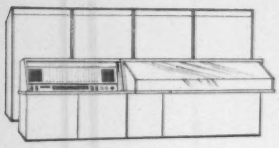




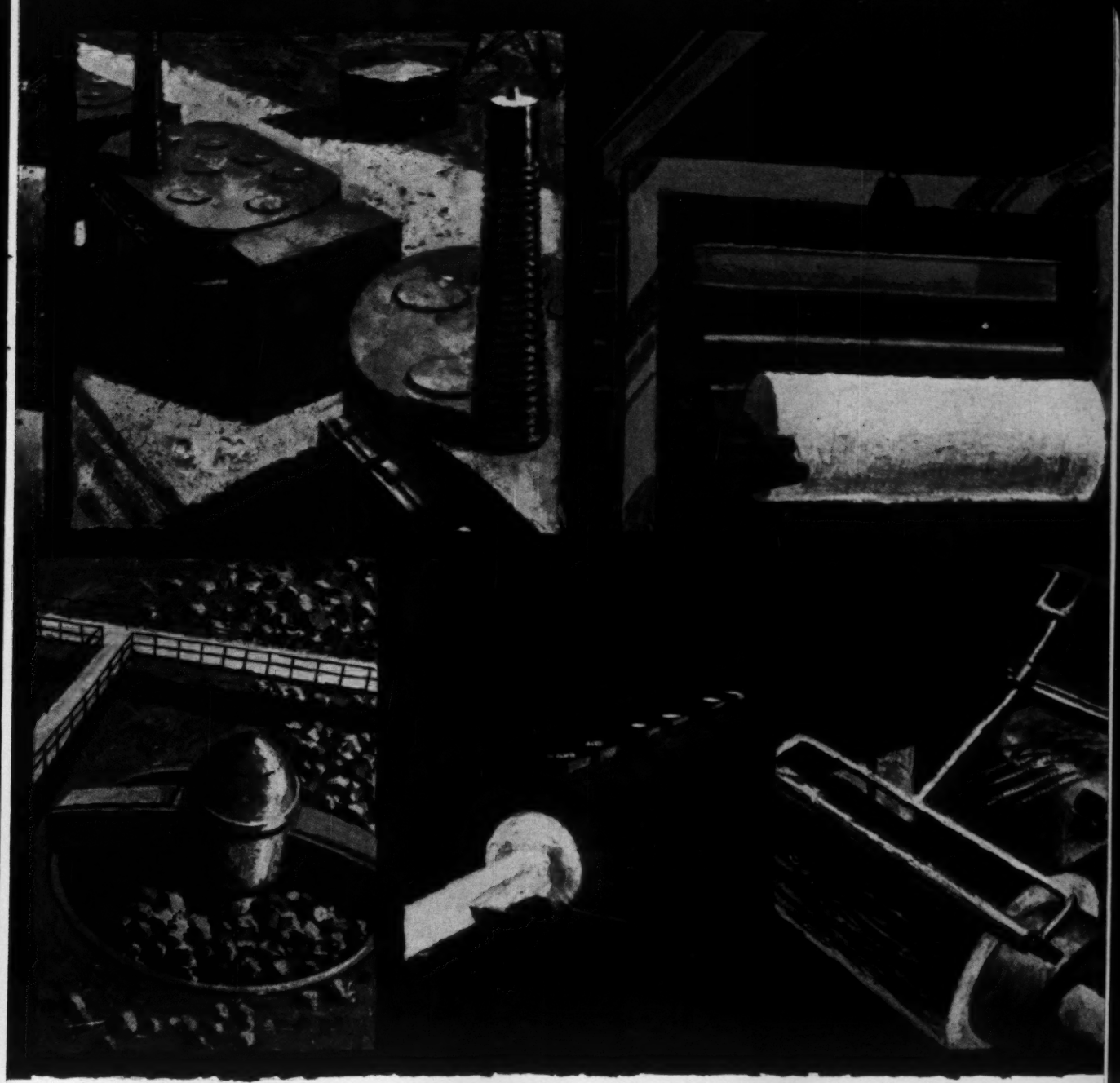
CORNERSTONE FOR YOUR AUTOMATION PROGRAM

CHEMICALS • ORE REDUCTION
PETROLEUM REFINING • PAPER • GLASS
CEMENT • ALUMINUM • UTILITIES • STEEL

General Electric announces the new GE 412, a second generation solid-state, stored program computer designed solely for industrial and utility applications.

The GE 412 Digital Control Computer, new "big brother" in the General Electric family of process computers, has been designed with the total systems concept and flexibility of equipment organization in mind.

PCA-2



The resultant versatility and capability of the GE 412 makes it custom-adaptable to many particular applications in many varied industries—data-logging and monitoring, data-logging and control, economic dispatching, director (or dispatcher) in a multi-control system.

The new GE 412 is extremely fast—capable of 25,000 additions a second. It incorporates a core memory with drum memory backup, plus more than 100 basic commands, to provide wide programming flexibility. The Automatic Program Interrupt feature and Programmable Elapsed Time Counters permit the regular survey of critical points without wasting valuable computer time required for constant checking.

General Electric offers you the two basic elements for your automation program—the new GE 412 Digital Control Computer and the application experience necessary to get it operating efficiently in your plant.

General Electric engineers can detail the available full line of input/output equipment and computer services including SYSTEM DESIGN, PROGRAMMING and AIDS, TRAINING, INSTALLATION SERVICES, and MAINTENANCE SERVICES—offered by General Electric to get your automation program in operation quickly... for lower production costs, increased profits.

INVESTIGATE THE NEW GE 412—*contact your nearest General Electric Apparatus Sales Office or the Process Computer Section, Industry Control Department, P.O. Box 2918, Phoenix, Arizona.*
IN CANADA, *contact Canadian General Electric Apparatus Sales Department, Peterborough, Ontario.*
OUTSIDE THE U.S. AND CANADA, *contact International General Electric, 150 East 42nd Street, New York 17, New York.*

Progress Is Our Most Important Product

GENERAL ELECTRIC

Here's a man who's ready to help you with a roll problem

But you don't need to have a roll problem to have a visit from Bill Curran, General Manager at National Roll. To the contrary, the "boss" spends a lot of his time with customers discussing their operations and roll requirements before problems have an opportunity to develop. This is typical of the personal interest National takes in helping customers get the benefits of maximum roll performance. For personal attention to *your* roll requirements, whether steel, iron or nodular iron, order from National. You'll see why . . . NATIONAL'S THE GROWING NAME IN ROLLS.

NATIONAL ROLL & FOUNDRY DIVISION
GENERAL STEEL INDUSTRIES, INC., Avonmore, Pennsylvania
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Subsidiary: St. Louis Car Company, St. Louis, Mo.

Grade "A" down the shipping line

Few applications demand so much from a metal as those in the dairy industry. Equipment which comes in contact with milk must be completely corrosion-resistant, easy to keep hygienically clean, and practically indestructible. For years many metals were tested and today, from milk pail to bottle-filler, virtually every piece of equipment used in the handling and processing of milk is made of stainless steel.

Product reliability like this depends on uniformity of both materials and production—the reason J&L stainless is bought regularly by dairy equipment manufacturers. J&L delivers quality consistently, order after order, to help you send Grade A products down the shipping line.

Get consistent quality stainless steel from your J&L distributor, *as* you need it, *when* you need it. He can also provide technical assistance.

Stainless Steel

Jones & Laughlin Steel Corporation

STAINLESS and STRIP DIVISION · DETROIT 34

STAINLESS

SHEET · STRIP · BAR · WIRE

HOUGHTON RUST PREVENTIVES

How many are "enough"?

A clean metal surface is an open invitation to *rust* or corrosion—easily the number one problem in metalworking. In 1869, *Cosmoline** was Houghton's single answer. Today, *Cosmoline* is still the answer. But Houghton now has many different *Cosmolines* and *Rust Vetos* to meet government and industry requirements: solvent-containing dry film, water displacing, non-solvents, fingerprint neutralizers and concentrates.

Since World War II, the trend in industry is toward lighter but stronger solvent-type coatings whose thicknesses are measured in thousandths of an inch. Among the dozens of Houghton solvent type preventives, the trend is also toward standardization on a minimum number of rust preventive compounds for general use. Leading in popularity are three *Rust Vetos* which can handle most industrial rust problems effectively.

Rust Veto 377 (indoor)

This is far and away Houghton's most outstanding preventive for long term indoor storage of open or packaged machine parts and equipment! It also provides excellent protection on phosphatized and blackened surfaces. It is a solvent-type compound that deposits a transparent film. Rust Veto 377 protects metal surfaces for up to a year, yet can be easily removed with a mild solvent.

One of its most important built-in properties is polar activity. Rust Veto 377 actually pushes water aside, gets under it and clings to the metal. You can even apply it to dripping wet surfaces and get complete protection from rust.

Economy is another important feature. Because it leaves only a .0003" thick film, Rust Veto 377 provides efficient protection of a much greater area than is possible with the thick, greasy preservatives. Used on all types of ferrous or non-ferrous metals, it is non-gumming, non-staining, compatible with lubricants, and sprayable to −40°.

This combination of properties makes Rust Veto 377 the ideal, across-the-board, indoor rust preventive for such products as hardware, bearings, razor blades, dies, tools, gauges, and idle or stored machinery.

Rust Veto 342 (outdoor)

For metals stored outdoors over long periods, new solvent type, Rust Veto 342 is an excellent general purpose preventive. When applied (dip, spray or brush) it forms a non-tacky, dry film that will not chip or crack. It protects metals from humidity, salt spray and weathering.

Two features make Rust Veto 342 unique among heavy duty rust preventives. (1) It provides heavy duty protection from rust for long periods, yet can be easily *removed* with only a solvent-soaked rag. (2) It deposits a *transparent* film. It will not obscure stamped numbers or coding on stored products and equipment.

Rust Veto MP (Multi-purpose)

This is an economical and versatile concentrate which can be diluted with water, oil or solvents, or used neat. It is good for indoor and limited outdoor protection of metal surfaces. Not intended for the same jobs as either 377 or 342, MP has a definite place in the rust prevention picture.

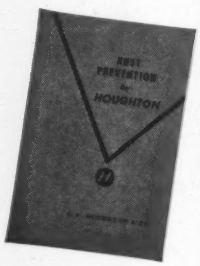
As the name indicates, it is a multiple purpose preventive concentrate. In undiluted form, MP is an oil type preservative that will protect metals during extended periods of indoor storage. Diluted with mineral oil it makes a slushing type rust preventive. Mixed with solvent it is a readily sprayable, water-displacing product. Diluted with water it is a fire-resistant, emulsion-type preventive. It is an effective fingerprint suppressor when diluted with a combination of water and solvent.

A Field for Specialists. No one, two or even twelve rust preventives can handle all rust problems. There is a definite need for thick, grease type preventives as well as special, spark plug varnish, aerosol sprays, wax coatings and others.

The trick is in having the parts properly cleaned (rust preventives will not work effectively on a dirty surface) and then selecting the fewest number of cleaners and rust preventives to do the most jobs, efficiently and economically. And only a specialist on both cleaning and rust prevention can help you arrive at the right answer. Why not ask your Houghton representative for a complete analysis of your requirements? Call him today or write E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa.

New Rust Veto Spray has hundreds of uses in metalworking plants.

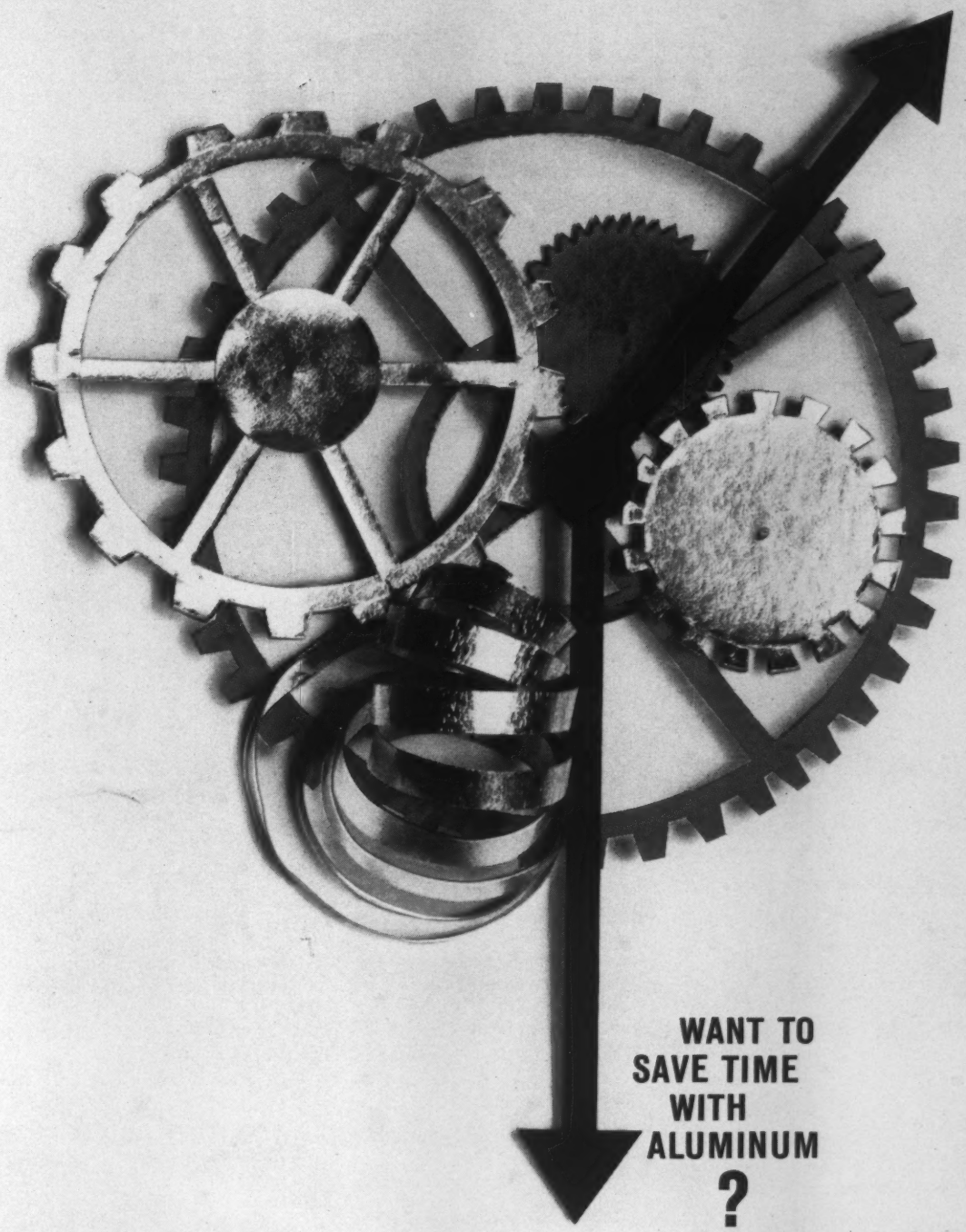
Brochure outlines major rust prevention problems and their solution. Write for your copy.



*Original Houghton TM, still used for Houghton government specification rust preventives.

Houghton

INDUSTRY'S PARTNER IN PRODUCTION



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Come to Anaconda Aluminum where our objective is to save you time by helping you get maximum efficiency with aluminum products. You can save production time by utilizing the fast, personalized service Anaconda Aluminum provides. You can save on inspection time because of the consistent, extra quality built into Anaconda Aluminum products: plain and embossed sheet — coiled, flat, circles or blanks; plate; plain or laminated foil; and ingot. Call or write your nearest Anaconda Aluminum Sales Office or Anaconda Aluminum Company, Dept. IA-7, Louisville 1, Kentucky.

ANACONDA ALUMINUM

TINIUS OLSEN

The standard Charpy V-notch specimen is pre-cooled to a minus 10°F. and secured in the tester. A heavy pendulum weight is then dropped through an arc to strike the weldment. Many of the Easyarc 328 coupons stopped the pendulum cold — as shown both at the left and in the closeup view at the right, photographed at the moment of impact.

Airco's NEW class E-7018 electrode stops Charpy tester cold!

EASYARC 328 – iron powder, low hydrogen electrode for mild steel

Welds made with Airco's new Easyarc 328 give you outstanding impact strength in all approved applications. The dramatic test results achieved recently in the widely used Charpy test show why—

Typical industry requirements call for a Charpy V-notch value of 20 ft.-lbs. at minus 10°F for welds made with E-7018 electrodes.

Put to this back-breaker test, the new Easyarc 328 chalked up 190 ft.-lbs. average! Many coupons stopped the sledgehammer blows of the Charpy impact tester cold!

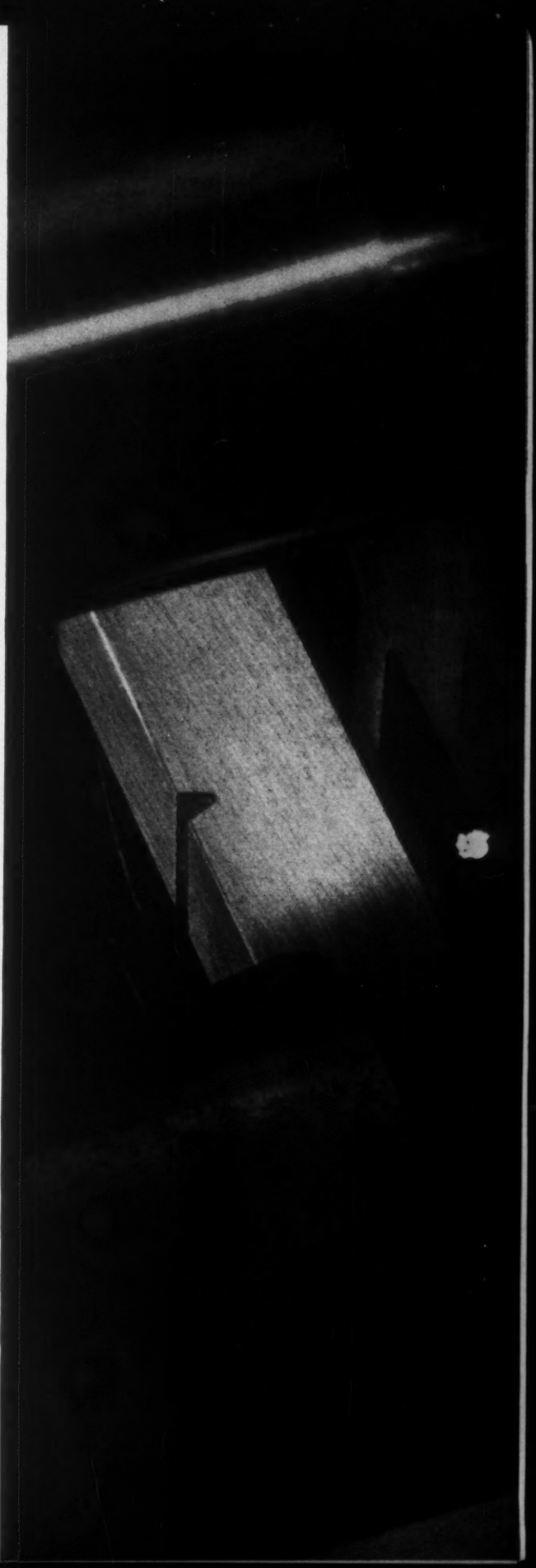
Consider also the other plus values of Easyarc 328— Excellent usability in all positions . . . High rate of deposition . . . Low spatter . . . Easy slag removal . . . X-ray quality welds . . . Works with either AC or DC reverse polarity.

Where Easyarc 328 will help you weld better — On low alloy high strength steels . . . Hardenable steels . . . High carbon steels . . . High sulfur steels . . . Enameling steels.

Here is a "natural", too, for industrial piping, and restrained joints in thick sections of mild steel.

You are offered Airco's new iron powder, low hydrogen, mild steel Easyarc 328 as the finest E-7018 electrode on the market today. Designed to produce vertical fillets and butts with flat profile.

Contact Airco — for engineering data and samples of industry's newest Class E-7018 electrode—Easyarc 328.



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AIR REDUCTION SALES COMPANY

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METALGRAMS

. . . news of "Electromet" ferroalloys and metals

UNION CARBIDE METALS

JULY 1961

MAKING MORE PERFECT METALS -- Vacuum melting is meeting the higher property requirements of space and atomic uses. This young, growing industry is producing steels and superalloys with better properties than those melted in air. These vacuum-melted alloys have better ductility, impact strength, fatigue strength, and rupture and magnetic properties. Vacuum melters are also making superalloys and ultra-pure metals that cannot be melted in air. These metals and alloys have produced impressive results. Ball-bearing life has doubled. Jet engines operate longer at higher temperatures. Nuclear reactors can run efficiently.

* * *

ALLOYS FOR VACUUM MELTING -- Union Carbide Metals supplies a complete range of ferroalloys and metals for steels and superalloys melted by both major vacuum-melting processes. In vacuum-arc melting, an air-melted electrode is remelted to improve purity and uniformity. Ferroalloys must be added during air melting since vacuum-arc melting does not allow alloy adjustments. In vacuum-induction melting, alloy additions are made in the vacuum furnace. Metals such as "Elchrome" electrolytic chromium and "Elmang" electrolytic manganese are desired for such additions because of their purity. For more information, call your Union Carbide Metals representative today. Also, ask for the article, "Making More Perfect Metals," in the Summer 1961 issue of UNION CARBIDE METALS REVIEW.

* * *

ULTRA-PURE METALS, TOO -- UCM also offers ingots of columbium, tantalum, and vanadium metal made by a new vacuum process -- electron-beam melting. The electron-beam process provides the purity needed to make these metals ductile and easily formable. All three metals have one property of wide interest to metallurgists -- high strength at elevated temperatures. Thus, they may be the key to future hypersonic flight vehicles. The three metals also resist corrosion. In fact, tantalum chemical equipment resists both oxidizing and reducing media better than most other materials. Columbium effectively resists molten salts. Other properties: columbium and vanadium have moderate neutron cross-sections, allowing use in nuclear reactor structures. Tantalum has ideal dielectric properties for electronic capacitors. Your UCM representative can give you further information and literature on each of these metals.

* * *

UNIQUE VACUUM PROCESS...BETTER ALLOY ADDITIONS -- In the world's largest vacuum furnaces at Marietta, Ohio, UCM eliminates certain hard-to-remove elements from ferroalloys and metals. They aren't removed by melting. They are removed by refining in the solid state. For example, carbon is virtually eliminated from "Simplex" ferrochrome, allowing carbon-free additions to stainless steel. Gases are removed from "Elchrome" VG chromium metal. Thus, less gas is evolved when the metal is used in vacuum-induction melting. Also, nitrogen is added to certain chromium and manganese alloys...for convenient nitrogen additions to stainless steel. Learn more about this unique vacuum process by writing for the article, "The Silent World of SIMPLEX," in the Summer 1960 issue of UNION CARBIDE METALS REVIEW.

* * *

UNION CARBIDE METALS COMPANY, Division of Union Carbide Corporation, 270 Park Ave., New York 17, N. Y. In Canada: Union Carbide Canada Ltd., Toronto.

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RECENT PRICE CUTTING may not have ended the battle for the linepipe market. Underlying the price battle is the fight between welded and seamless pipe. Because investment for welded pipe production is less than for seamless, welded pipe makers had more price leverage. Big seamless producers watched price cutting until orders went to others. Then they cut.

MACHINE TOOL MARKET RESEARCHERS report their forecast curves are now confirming hopes of a stronger second-half, followed by further gains in first half 1962. They say this is significant as their sales don't follow a strong seasonal pattern, and there would be little reason to expect major changes between halves. Forecast gains run up to 10 pct.

MOST COMPANIES HAVE CHANGED THEIR SALES and marketing organizations during the past several years. A survey of 168 companies by the National Industrial Conference Board shows that 75 pct of them have made significant changes. Most changes are swings from sales administration to the marketing concept.

INDUSTRIAL HEATING EQUIPMENT scored big gains in new orders in May over April. Orders totaled $9.6 million, up 129 pct from April. May business was up 52 pct over May, 1960.

INDUSTRIAL BUYERS REPORT improvement in new orders is draining away raw material stocks more quickly than anticipated. This is indicated in the June survey of the National Assn. of Purchasing Agents. Some 28 pct of the buyers (a year's high) reported lower levels of stock than in May.

BUSINESS MACHINE MAKERS are finding W. Germany both a lusty competitor and a big market. Several U. S. producers with factories there have shared in a $10 million sales gain over the 1959 record $166 million volume. W. Germany machine exports advanced 25.9 pct in 1960; imports, 45.6 pct. U. S. Commerce Dept. credits export gains to, "new and improved products."

MORE SALESMEN SHOULD "HIT THE ROAD." This is a finding of Chicago exective counsellor, Frank Stacy. Depth interviews show that men who "owe it to their families" not to travel are really afraid of the challenge. Mr. Stacy finds wives his strongest ally in urging men to leave office ruts. And he finds road selling one of the best springboards to job promotions.

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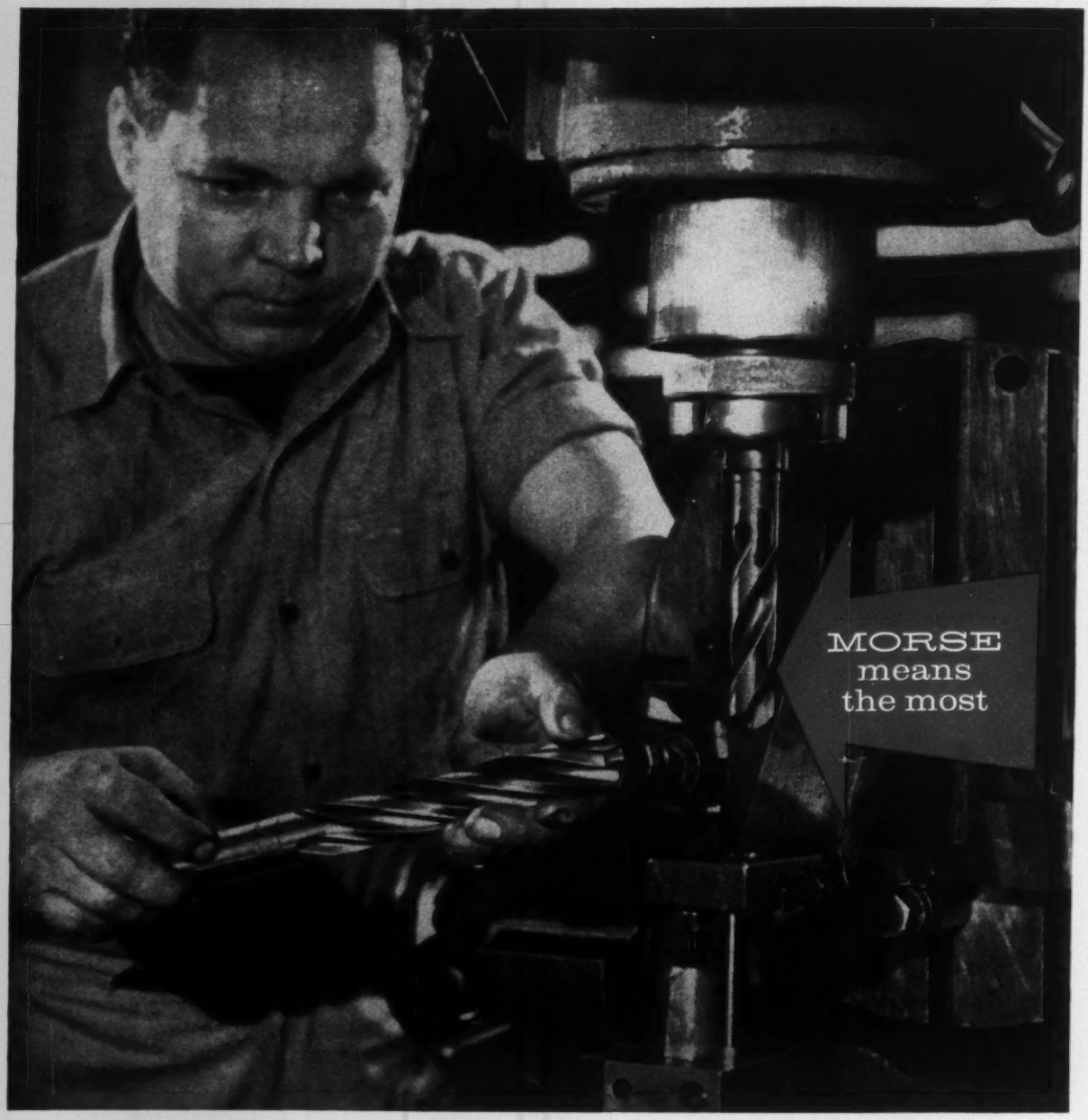

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Shipbuilding Contracts Hit Record Peace-Time Level

Shipbuilding, in the doldrums in recent years, is beginning to show new life. Ship Replacement Program means a real boost.

But yards without government subsidies wonder if better times are really here.
By B. F. Surer

■ From all indications, U. S. shipbuilders can look ahead to better times. In fact, a shipbuilding pick-up is already underway.

But, as usual, the drydock picture in the United States is complex, clouded and confusing. No one is really ready to make any firm predictions.

Government - subsidized shipbuilders and American flag lines, which actually form the nucleus of U. S. shipbuilding activity, say prospects are good. Some even call the outlook for ship construction "excellent." But the demand for non - subsidized ships, chiefly oil tankers, hasn't materialized in recent years. This field could break open in the next few years, but there's nothing tangible at this time.

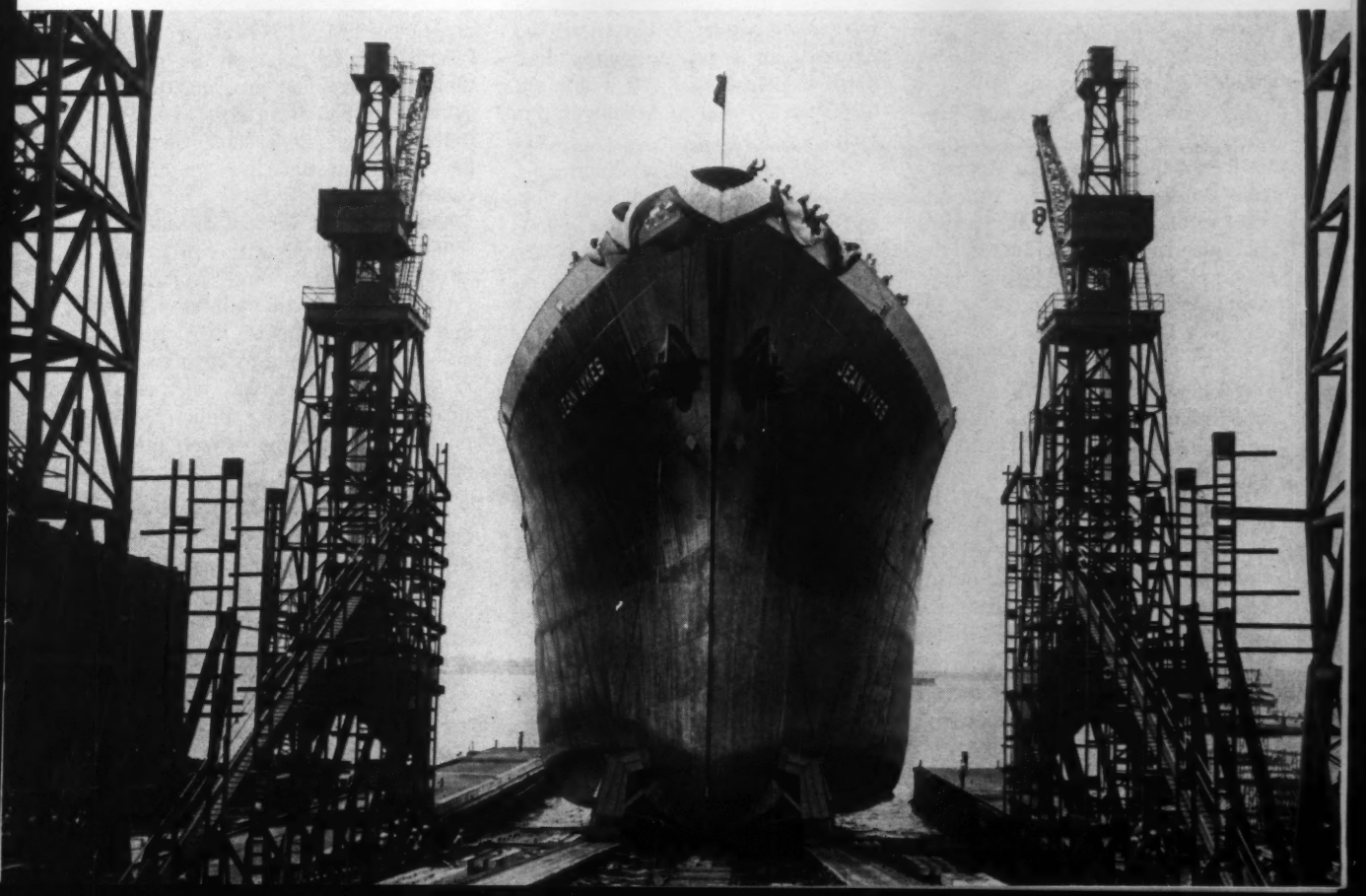
Shipbuilding in 1960 took a beating world-wide. There were only two nations to show significant gains over 1959. Japan delivered 150 ocean-going merchant vessels, 29 more than in 1959. And the Netherlands turned out 62 ships for a gain of nine over the previous year.

But American shipbuilders delivered only 22 ocean-going vessels in 1960 compared with 26 in 1959.

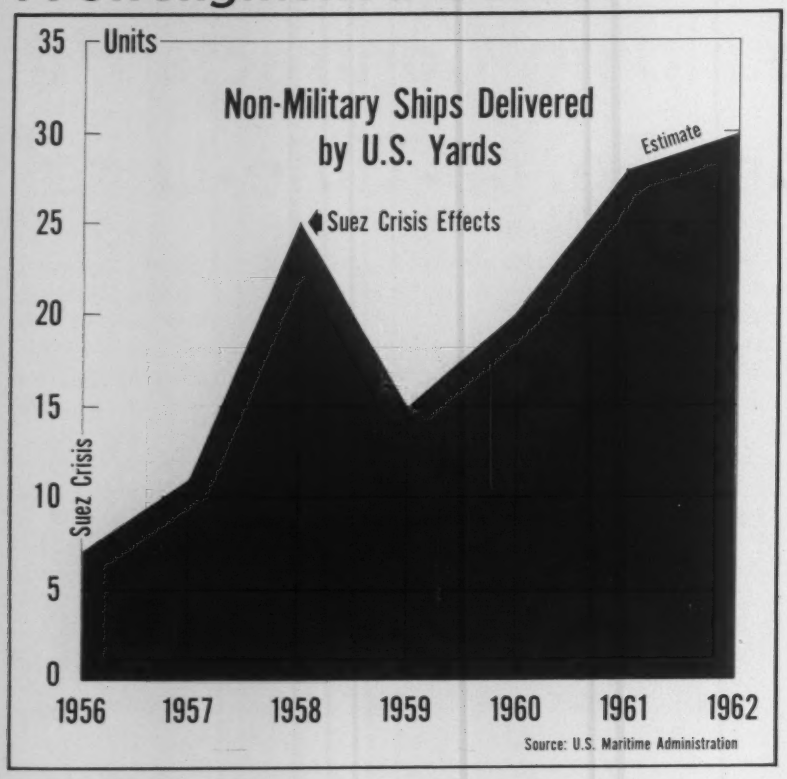
Looking Ahead — Nevertheless, these facts point to increased shipbuilding activity:

(1) There were more than 70 ships under contract or construction in the U. S. at the beginning

BIG PROGRAM: With government subsidies, U. S. shipbuilders will build $4.5 billion worth of new ships by 1965.



A Strengthened Outlook



of this year. This, according to the Maritime Administration, is a record peace-time high. Thirty vessels are slated for delivery in 1962.

(2) With the subsidy funds provided under the Maritime Act of 1936 and the MA's Ship Replacement Program, more than $4.5 billion worth of non-military vessels are due for construction in the next five years. This would place merchant shipbuilding at about 28 vessels per year.

(3) The Navy recently launched a $3 billion program for new ships. Much of this work will be awarded to private yards.

Life Span—(4) The average life of a cargo ship is 20 years. A large percentage of the vessels now in operation were bought or built during World War II. This means replacement will be necessary within the next few years. Then, too, competition from better and faster foreign ships means modernization is a must if U. S. lines are to survive.

(5) According to figures released by the Bureau of Labor Statistics, employment at private shipbuilding yards rose from 107,400 in March, 1960 to 121,500 in March of this year.

There are two factors hampering non-subsidized shipbuilding. Following the Suez crisis in 1956, tanker construction boomed. In fact, ship construction jumped from seven vessels in 1956 to 11 in 1957 and 25 in 1958. But then worldwide shipping hit a serious slump in the late 1950's and many lines were left with a surplus of vessels.

Less for Repairs—One of the effects this slump has produced is less repair work on vessels. Most ship yards are handling more than 50 pct less repair work than was performed in 1955 and 1956. The reason for this is tough competition. Shippers need to keep their vessels on the go and can't afford to spend the money for repairs. One shipbuilder notes: "The lines only bring their ships into drydock now when they are forced to by regulations."

But now the shipping slump may be easing. Leigh R. Sanford, president, Shipbuilders Council of America, told The IRON AGE: "I think we're pulling out of the slump now. It's a gradual gain, but it could make a difference in tanker construction in the next few years."

Expanded Program—The MA's Ship Replacement Program, launched in 1957, is a little more explicit. In its initial dry-cargo freighter program, 300 new ships were slated for construction by 1963 at a cost of $3 billion. Now it has been expanded to $4.5 billion. Forty pct of the payment for these vessels comes directly from the Federal government.

MA's Bart J. McGarry told The IRON AGE, "The 1960's should bring a revival of interest in U. S. shipping. This, of course, means more and newer ships will be needed."

Already Active — He points out that several lines are already actively engaged in their replacement programs. Moore-McCormack Lines, Inc., for example, is planning a replacement program of 45 ships at an estimated cost of $489 million. Five ships have already been delivered and five are under construction.

United States Lines Co. will be replacing 48 vessels with a price tag of $680 million. And American President Lines, Ltd., will be spending, with government help, $522 million to replace up to 26 ships.

Already 42 ships are under construction in the $4.5 billion MA program. And nine vessels have been delivered.

Profit Question — However, though the tempo of orders has definitely increased this year, there is still a question of profits. There are 15 shipbuilders competing through open bids for work under the MA program. And there have been some years recently when only 15 ships have been contracted. This means a slim profit margin.

Will Tool Steel Sales Move Up?

Producers Hope to Regain Growth Momentum

Tool steels have been in a dormant period — in terms of growth.

But new products and other industry developments indicate an upward movement in sales is on the way.

By G. J. McManus

■ Tool steel producers think they are ready to start growing again.

After a flat postwar period, producers look forward now to moderate but steady improvement.

No one is predicting a surge in demand. One mill sees tool steel moving up 3 to 4 pct a year in the sixties. Another says the product will roughly match the gains of carbon steel.

Better Outlook — For the tool steel industry, this is fairly bullish talk. Tool steel shipments last year were 87,000 tons. This was exactly the same as the 1947 total. It was about 50 pct under 1951 tonnage and 60 pct under the World War II peak.

These percentages are exaggerated by last year's recession, but it is clear the past 15 years have not stamped tool steel as a growth product.

Imports a Threat — Moreover, the current optimism is voiced in the face of a serious new threat. Imported tool steels have begun pushing hard into domestic markets. In 1958, imports accounted for less than 2 pct of domestic sales. Last year, they were between 8 pct and 10 pct. Both hot-work and high-speed steels are being offered at reduced prices.

Nevertheless, domestic mills are thinking in terms of market growth. They feel market losses due to technical change have been digested and stabilized. They are determined to find ways to beat back the foreign threat.

Part of the technical challenge has come from carbides. These have lopped off a sizable part of the market for high speed steels. According to tool steel men, the big adjustment in this area has been completed.

Technical Plateau—Also subsiding, say producers, is the revolution in the quality and use of tool steel itself. The head of one mill estimates cutting tool life has been extended 80 pct by better grades and more efficient use. He does not look for technical change to stop but he feels much of the room for improvement has been used up.

On the matter of foreign competition, tool steel men concede they are particularly vulnerable in some respects. They have a high priced product ($2200 a ton): transportation is a relatively minor part of the delivered cost.

Labor is a big part of production expense; it is estimated more than 10 man-hours go into a ton of tool steel for every one required for carbon steel. Producers see no hope that this differential will be considered in enabling them to break away from the labor pattern of major mills.

"Not a chance," says a tool steel man. "We just hope they don't demand some special concessions from us."

Assets Counted — At the same time, tool steel men feel they have special assets in the fight for world markets. In tooling applications, quality and service are critical factors. American producers feel they can offer important advantages in all matters of product performance and distribution efficiency.

There is some question how far Europeans have come on tool steel quality. One domestic producer points out his mill is able to sell in the backyards of foreign suppliers. Machinery builders abroad

Tool Steel Looks for Comeback

Shipments of Steel Products

Year	Tool Steel Shipments Thousands of Tons	Pct of Total	Total Steel Shipments Millions of Tons
1960	87	0.1	71.1
1959	96	0.2	69.4
1958	70	0.1	59.9
1957	99	0.1	79.9
1956	126	0.2	83.3
1955	115	0.1	84.7
1954	84	0.1	63.2
1953	116	0.1	80.1
1952	121	0.2	68.0
1951	171	0.2	78.9
1950	90	0.1	72.2

point to their use of American steel as a selling point.

"There's still a quality lag," says J. E. Workman, president, Latrobe Steel Co. "But I'm not hanging my hat on it," he adds.

Improvement Needed — Mr. Workman feels domestic mills must make themselves fully competitive. His own company is modernizing to the tune of $1 million this year, is planning for $1.5 million in 1962.

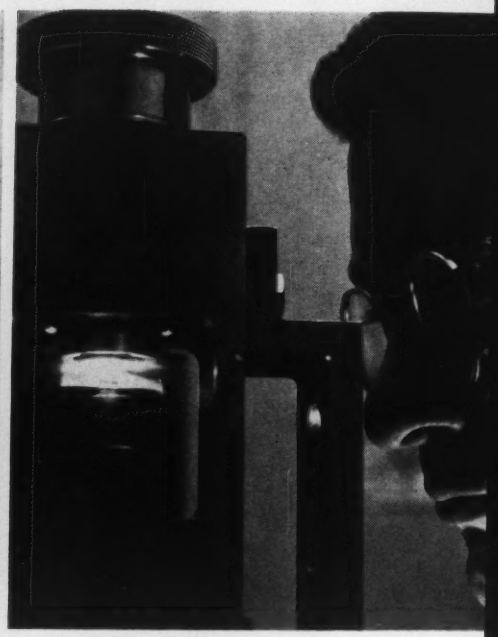
In the interest of both service and cost, American producers are moving to reduce the number of grades now being made. Allegheny Ludlum Steel Corp. and others have come out with selector systems for customers. Crucible Steel Co. of America recently came out with a general purpose high-speed steel. Crucible estimates it has reduced grades and variations 30 to 40 pct through customer education and other means.

With greater standardization, tool steel men feel they can reduce inventory costs for themselves and customers. They have been going over requirements to determine order patterns. Mill and warehouse stocks of standard grades are being beefed up. Low profit items are being weeded out. Crucible Steel, in particular, has been strengthening its distribution system with computer control, teletype communication and added warehouse locations.

Summing Up—But with all their new initiative, tool steel men are not kidding themselves that they have an easy road ahead. Sales have been zig-zagging upward since last July, when they hit bottom after a long plunge. A July dip is expected and no immediate strong market is in sight.

Pricing is competitive, but there is no widespread cutting. There are some spot cuts when a mill runs into foreign prices, sources say. Mills had to absorb a 10 pct molybdenum price increase this month and may absorb wage increases this fall without a price boost.

HOLE IN ONE: Supersonic water bullet punched this hole in a piece of aluminum, dented steel.



IN A FLASH: Bright flash of light is generated by impact of single drop of water hitting metal.

Water Pierces Metal

■ Single drops of water are being fired into solid blocks of steel by Westinghouse Electric Corp. research scientists. Purpose: To study the action of water droplets upon the rapidly spinning blades of a steam turbine.

Over a long period of time, drops of water in moist steam erode the leading edge of a whirling turbine blade. It occurs in the low-pressure section where blades are longest and the tips are traveling near supersonic speeds. By the time steam reaches this section it has started to cool and drops of water condense from the steam. Impact of the water drops on the blades causes the erosion.

Fire One!—In order to study this effect under controlled conditions, Westinghouse researchers "fire" a water "bullet" at a piece of test material at speeds up to 3400 mph. The experiments show a drop of water can be made to penetrate thin pieces of metal like a rifle bullet. Or it will create a "crater" in solid blocks of steel.

The experiment was described at an American Society of Testing Materials symposium on erosion last week by S. M. DeCorso and R. E. Kothmann.

How It's Done—They said the supersonic water "bullets" are produced by compressed air. A small lead pellet is fired down a 30-in. metal tube by gas pressures of about 150 psi. The pellet hits a small reservoir of water having a tiny opening aimed at the metal sample.

On impact, the lead pellet squeezes out a jet of water which crosses a 1-in. gap and strikes the metal's surface. The drop of water covers the distance in about 15 millionths of a second.

A flash of light, lasting less than 1 millionth of a second, is emitted at the instant of impact of the water with the metal surface. Why this happens is not yet understood.

What Is Really Good Service?

GE Develops Answers to Customer Satisfaction

The problem of customer satisfaction with service after the sale has bothered many companies for some time.

But General Electric Co. researched the question. And it came up with an answer.
By J. D. Baxter

■ What does it take to satisfy customers in servicing major appliances? The obvious answer: Good service at fair prices.

But what is "good" service? And what are "fair" prices? This is really where service agencies and customers disagree.

General Electric Corp. thinks it has found the answers. The company now has over a year's experience with a product service plan that is a result of a major research effort launched in 1958. This research was aimed right at the basic question: What satisfies service customers? In other words, what is "good" service — from the standpoint of the customer?

It Works—GE has something to back up its claim to finding answers. Says E. A. Anthony, consultant, Product Service: "The appliance service program we now use, based on the extensive research, has scored a 75 pct improvement in customer service satisfaction. And further improvement is being made."

Mr. Anthony adds that most companies' research service costs. They don't go into basic "customer satisfaction" research. "The result, too often," says Mr. Anthony, "is that service costs are reduced. But service quality suffers. And customers are more unhappy than ever. Low service costs don't build brand loyalty. Happy customers do."

Some of the service factors are combined for weighting purposes. For example, "availability" and "dependability" are combined. This is because a customer is pleased when a company commits itself to a specific time to do a service job. But this satisfaction will be wiped out if the promise is not kept.

Factor Weights—Here is GE's final combination and weighting of factors: Speed and urgency, 45 pct; technical competence, 40 pct; availability and dependability, 15 pct. The "price" factor is not included because it is found to be an "overall modifier." And it applies only to ex-warranty service.

"At this point," says Mr. Anthony, "we find it essential to express results in customer-oriented terms rather than in service shop language."

In these terms, GE has found all service customers fall into four satisfaction levels:

Dynamic satisfaction: This level covers those customers who are very pleased with service and become "boosters" of the company.

Passive satisfaction: Includes customers with modest satisfaction. These people have a "leaning" toward the company.

Passive dissatisfaction: These people show modest dissatisfaction. They "lean" away from the company, but are not vocal about it.

Active dissatisfaction: Customers in this group feel they have received poor service. These people oppose the company and the product.

Index Number — The company finds it easy from this point to set up quantitative measures of customer satisfaction. Each of the weighted service factors carries a numerical value. According to the sum of these numbers a customer is classed into an appropriate "satisfaction level."

Key to Happy Customers

Research at General Electric pin-points six factors that determine customer satisfaction with service:

1. Urgency and interest—It's important to the customer that the recipient of a service call shows interest and a sense of urgency.

2. Speed of service—Customers are sensitive about how fast a job is done. This "speed" is measured by the elapsed time from call-for-help and job completion.

3. Availability—Customers like it when a service group will commit itself to an appointment with the customer.

4. Dependability—This is simply a case of service meeting the promise it makes.

5. Technical competence—Customers look for, and expect, "export service work."

6. Price—The price charged is important in forming customer reaction. But, GE learned, it's not as vital as previously thought.

MAN-MADE BRAINS: Automation hasn't replaced hand work in assembly of GE's process control computers.

Computers Click to New Records

$10 Billion Annual Sales Predicted in Next Decade

An industry that's never looked back, computers will hit $1.5 billion in sales and rentals in 1961.

By 1970, it will be a $10-20 billion-per-year industry, with 80 pct of the units going to markets that don't exist today.

By K. W. Bennett

■ An industry that's never known a setback, computers are totting up another record year.

From $1 billion in 1960, computer sales and rentals will hit $1.5 billion in 1961, and go on to $4.5 billion in 1965. The outlook by 1970: $10-20 billion in annual sales, with 80 pct of the units going to markets that don't yet exist.

Government sources are less conservative than the industry itself. Government is guessing at a $2 billion annual gain.

70 Compete—At least 70 companies are aiming at this target, with 12-16 as the major computer builders of the 1960's.

At the moment, the smallest market is also the most rapidly growing. Industrial process computer sales amounted to $15 million this year, say General Electric Co. marketers. Industrial purchasers will buy computers at a $92 million annual rate by 1965, they believe. That's a 900 pct gain.

Ten-Year Buildup—As a volume industry, computers date only to 1950.

A major dislocation occurred in 1960: The vacuum tube computer began to fade and the transistor computer arrived.

But it's been a steady gain, all the way.

International Business Machines Corp., biggest of U. S. builders, says there are 4900 computers installed in the U. S. at present. In 1957 there were about 800.

Major Model—By the end of next year, IBM expects to have 4000 units of a single model (the general purpose 1401) working in U. S. plants and offices.

General Electric introduced a process control model last month. Company marketing men say installation of this model in the '60's will equal total process control models by all manufacturers in use today.

Remington - Rand Div., Sperry Rand Corp., delivered its 300th Univac in May. It has an order backlog now for another 212.

30,000 Translators — There are already 30,000 "programmers" at work. They translate industrial and research problems into codes a computer can understand.

By the end of the decade, according to an independent study, hundreds of thousands of programmers will be needed. Demand will exceed supply at least through 1970.

Total manufacturing employees in the computer industry rose 50 pct in the late '50's. Through the 1960 recession, IBM hired at a 750-man-per-month rate.

Biggest Builders — Companies sharing 1961's $6-800 million scientific and business computer market are IBM, Remington - Rand, Radio Corporation of America, Burroughs Corp., and Minneapolis-Honeywell Regulator Co. These are the top five in order of importance.

At least seven other companies are prominent. General Electric puts 1965 value of this market at $1.5 billion.

Mill Brains — Industrial process computers are electronic brains that can run a steel mill or machine job shop. GE, Thompson Ramo Wooldridge, Inc., Daystrom, Inc., RCA, and Minneapolis - Honeywell are rated tops among 16 other producers in the field.

In rapid succession recently, IBM, Remington-Rand, and GE have announced new models aimed at process control. This indicates the rapid growth rate in this market.

Military Market—A third major market area for computers is special military work.

This area grossed $456 million for computer builders last year, GE marketers say. It still will hit $465 million this year, and soar to $525 million in 1965.

The GE forecast could be conservative. John Diebold Assoc., market analysts, bet on a $2 billion defense computer market in 1965, and total computer sales and rentals of nearly $4.5 billion.

Industrial Race—Computer makers are racing for the newly arrived industrial market. And they are bringing veteran metalworkers into the picture as team mates.

IBM is working with Allis-Chalmers Mfg. Co. for industrial process computer construction. Philco Corp. is listed with Leeds & Northrup Co.

New products and growing markets mean capital expansion. IBM grossed over $1.4 billion in 1960, spent just about one-third billion on capital expansion. It now operates, in addition to growing U. S. facilities, 18 manufacturing plants and six labs abroad.

IBM is still expanding, as are the other top 15 computer manufacturers.

Varied Markets—A spokesman for a major Eastern computer company says, "I think one of the reasons the industry grows this fast is the variety of avenues we have ahead. We build newer, faster models every year, to do new things. At the same time, we find new applications for equipment we already build."

The figures suggest he is right. Sperry Rand's Remington - Rand Div. offers 11 computer models, of which four were introduced this year.

IBM already has 200 electromechanical and electronic equipment items. It is entering the process control field with additional new equipment.

At least four manufacturers have shown five new pieces of equipment in the past month.

Rental Areas—Companies which have not yet bought their own computers are renting them, or buying time in computer centers.

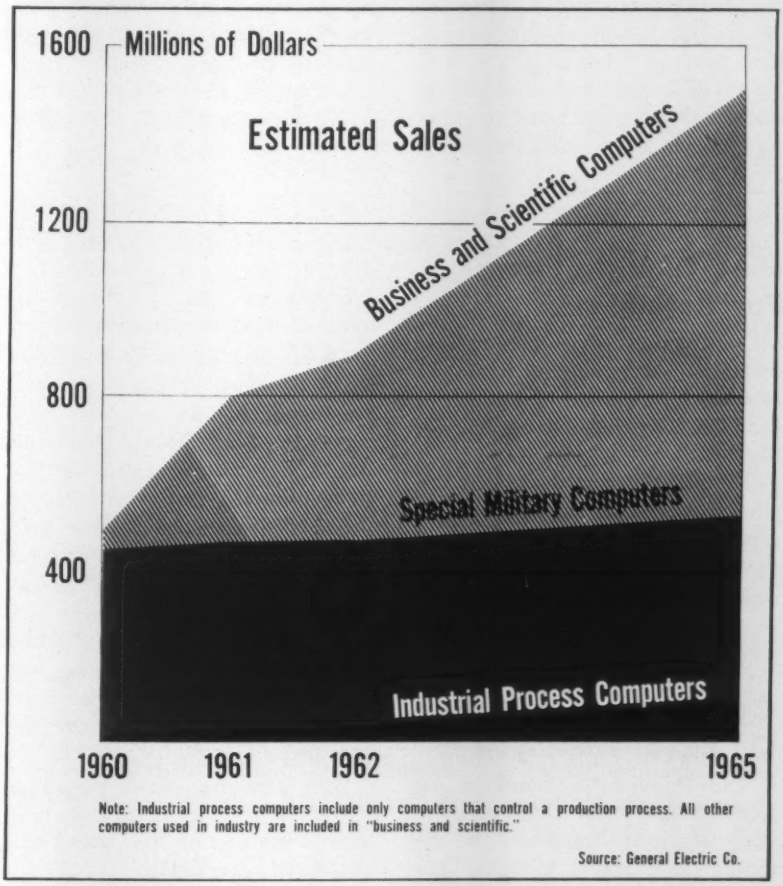
One chain of data processing centers has 10,000 customers.

McDonnell Aircraft Corp., St. Louis, numbers a bank among customers who buy time in the aircraft manufacturer's computer room.

Other metalworkers, particularly in the aircraft industry, earn part-time income the same way.

Growth Eras—Is growth enough? An engineer for a large computer company says, "In 1959, they said the transistor computer was five years away. It's only two years later and nobody builds vacuum tube computers any more. From 1950 to 1960 was the era of the vacuum tube computer. 1960 to 1965 will be the era of the transistor computer. I believe that by 1965 we'll be entering the era of the cryogenic computer. After that, who knows?"

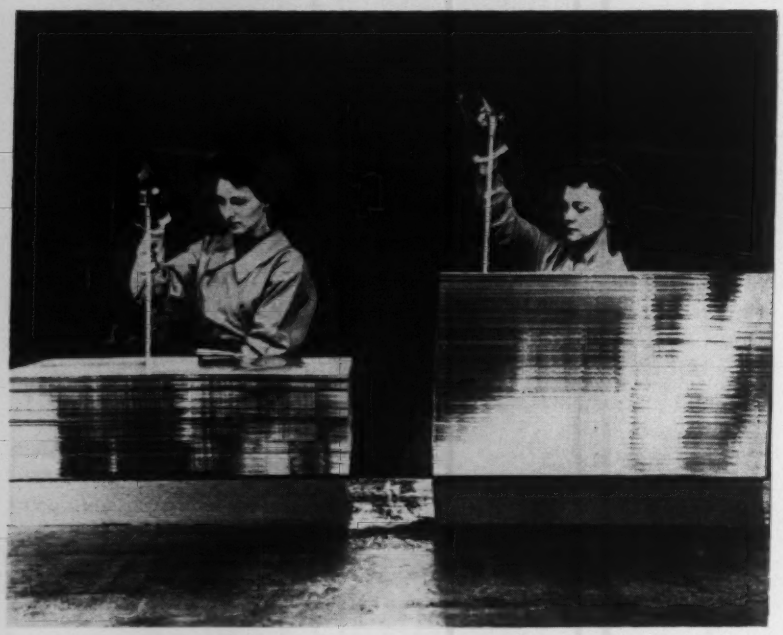
Steady Growth for Computers



Note: Industrial process computers include only computers that control a production process. All other computers used in industry are included in "business and scientific."

Source: General Electric Co.

Product in a Market Battle



■ Thin tinplates and aluminum can stock are locked in a competitive battle for the frozen citrus can market. In a recent step (IA, June 29, '61, p. 35), aluminum companies cut their price of can stock as much as 8.8 pct. This price cut was aimed directly at thin tinplate, which, in turn, was brought out to hold the frozen citrus market for tinplate producers.

Inland Steel Co.'s "Thintin" is one of the thin products now produced by most tinplate makers. Picture here shows how it stacks up with regular tinplate, right. Each pile contains 1344 sheets. "Thintin" stack weighs 2210 lb, regular tinplate 4130 lb.

New Tinplate Plant For Bethlehem

Construction of a multi-million dollar galvanizing line for the Lackawanna, N. Y., plant of Bethlehem Steel Co. is scheduled to begin about Sept. 1.

The plant, expected to be in operation in about a year, will be capable of turning out galvanized sheets up to 72 inches wide and coils up to 70,000 pounds—heaviest in the industry. Most produce a sheet from 48 to 60 inches in width.

Committee Gets Going On Equal Employment

The President's Committee on Equal Employment Opportunity is beginning to operate. And the operation is expected to bring new controversies into the labor field.

Employers will be affected by much of what the committee does.

Controversy began over Administration plans to insert anti-discrimination clauses in government contracts. Sen. Strom Thurmond (D., S. C.) calls the move an "extreme venture" in the tendency of the executive branch to take over functions delegated to Congress.

The equal employment opportunity committee is concerned with denial of employment opportunities for Americans because of race, religion, creed or age. The committee has held hearings on the age problem.

The committee, headed by Vice President Johnson, plans to hold further hearings on the various employment opportunities.

Inco to Sell Canadian Subsidiary to Atlas

Henry S. Wingate, chairman of International Nickel Co., told The IRON AGE that his company is selling its wholly-owned subsidiary, Alloy Metal Sales Ltd., to Atlas Steel Ltd., Welland, Ont.

Alloy Metal Sales, a distributor of aluminum, stainless steels, nickel and other metals, was formed by Inco in 1941 as an outlet for its products in Canada. But currently the distributor has 90 pct of its sales in non-Inco items.

Alloy Metal Sales has warehouses in Toronto, Montreal, and Winnepeg.

Picket Bill Shelved For This Session?

A controversial labor bill with much top-level backing seems doomed to sit the year out on a Congressional shelf. This is the so-called common site picketing bill.

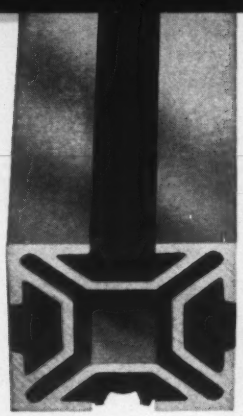
Support from President Kennedy, Labor Secretary Goldberg, and leading Congressmen doesn't seem enough to get action on the bill this year. Opposition from southern congressmen and a split in union's feelings for the bill appear likely to keep it tucked away.

The legislation would allow strikes now considered to be secondary boycotts. It would permit building trades unions to close down an entire construction job at a "common site" because of a dispute between management and members of any one union on the job.

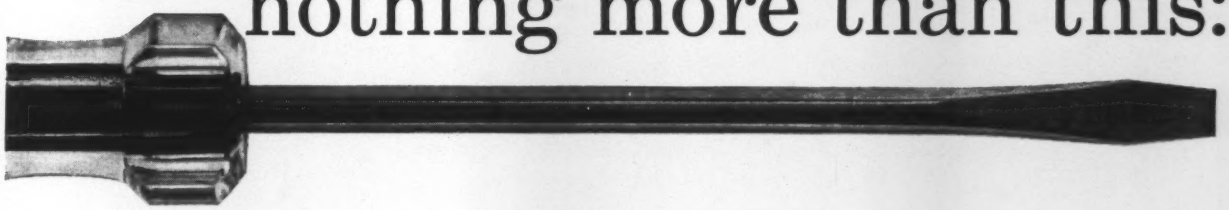
Construction Gets $5.6 Billion Push

The Administration housing bill, considered the biggest shot in the arm for the home construction industry since FHA, came out of Congress just as fat as President Kennedy sent it in.

The $5.6 billion bill sets up easier terms for home mortgages insured by the Federal Housing Administration, FHA home improvement loans, and public housing.



Because of this extrusion, engineered with Olin Aluminum, 15 floors of the TIME-LIFE building in New York City can be quickly re-shaped with nothing more than this:



Olin engineers helped design this unique extrusion to serve as the universal junction of movable wall panels. The genius of this extrusion makes it possible to change office size, shape and color in jig time with nothing more than a screwdriver! So many Olin ideas like this have saved so much time and money for fabricators, designers and architects that modesty forbids telling all. As versatile as aluminum is, it doesn't think, doesn't create designs, or doesn't fabricate itself. That's why Olin Aluminum offers you the services of its marketing and technical staff. They "think aluminum." Don't you think it would be a good idea to call Olin?

Olin
ALUMINUM
400 PARK AVE., NEW YORK 22, NEW YORK

INDUSTRIAL BRIEFS

Furnace Officers — A. E. McDonough was elected president of the Western States Blast Furnace & Coke Plant Assn. at the annual meeting. H. S. Wilson was named vice president.

New Warehouse—H. M. Harper Co. has opened a new warehouse in Miami, Fla. It will carry a complete stock of non-ferrous and stainless steel fasteners.

General Office—Chicago Bridge & Iron Co. has started to build its new general office building at Oak Brook, Ill. The two-story structure will provide 75,000 sq ft of space.

Potts Spreads—Horace T. Potts Co., Philadelphia, has expanded its steel warehouse capacity. A new building adds 22,000 sq ft of space.

Wheeling Along—After 45 years in the same location, Wheeling Steel Corp. is moving its New York district sales office to the new Morgan Guaranty Trust Bldg. at 522 Fifth Avenue.

Staff Transfer—National Supply Div., Armco Steel Corp., has moved administrative functions of the oil field sales dept. to Dallas.

New Citizen—Extremultus, Inc. has moved to a new plant in Englewood, N. J. The company has imported its product line from Germany. It will now manufacture its own belting in the U. S.

Bay City Move—Wellman Bronze & Aluminum Co. has moved plant facilities from Cleveland to a new foundry at Bay City, Mich.

Earthmoving Pioneer Gets Three Awards

MAN AND MACHINES: R. G. LeTourneau, pioneer inventor of heavy earthmoving equipment, poses with some of the equipment which recently brought him three top awards for engineering and design. The awards: International Progress Award by American Society of Tool and Manufacturing Engineers; 1961 Design Award, American Society of Mechanical Engineers; and Elmer E. Sperry award for transportation accomplishments.

General Shift—General Machinery Sales Co. has moved to new and larger quarters at 2010 S. Santa Fe Avenue, Los Angeles.

Name Change—Langdon Industrial Supply Co., Franklin Park, Ill., has changed its name to the Fastron Co. It makes threaded fasteners.

Institute Name—Western Reinforcing Steel Fabricators Assn. has changed its name to Western Concrete Reinforcing Steel Institute. Headquarters are at 1322 Webster Street, Oakland, Calif.

Bigger Plant — Edgewater Machine Co., Inc., has moved to a new and larger plant at College Point, N. Y. All design and special machinery building operations have now been centralized.

Yale Unity — Yale & Towne Manufacturing Co. has relocated its California Bay Area materials handling activities into a modern sales and service center and parts depot at San Leandro, Calif. All operations are centered in a $300,000 facility.

Clark Revamping—Clark Equipment Co.'s Industrial Truck Div. has expanded its service engineering organization. It has formed five service districts in the U. S. and Canada to provide faster service and maintenance.

Furnaces Fired—Midwest Casting Corp. has begun operations at the $750,000 Little Rock, Ark., casting plant. Main product will be gray metal iron castings, with facilities for aluminum castings.

Canadian Deal—Stainless Steel Products, Burbank, Calif., has signed an agreement with Patlon Aircraft of Canada, Ltd. It covers marketing of stainless products for the aircraft and missile industry to the Canadian government and major prime contractors.

Trademark Trade — An agreement between Canadian Fairbanks-Morse Co. Ltd., Montreal, and Fairbanks, Morse & Co., Chicago, returns to the U. S. company ownership and use in Canada of the Fairbanks, Morse name and trademarks.

THERE IS A SERVICE-PROVED

UNITED® ROLL

FOR EVERY ROLLING APPLICATION

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Progress...Leadership United for Sixty Years

United Rolls . . . Ask any steelman and he'll tell you those words are almost as common to him as gauge and reduction. You'll get a similar response from the men who roll paper and rubber.

Service-proved United rolls have been on the job for more than 50 years—longer than the age of many of the men who rely upon them today for precise trouble-free rolling.

Behind each United roll application stands United's service engineers, metallurgists and roll makers. They have a wealth of experience, knowledge and skill. That's why United rolls set the quality standards for the industry.

Plants at Pittsburgh, Vandergrift, Youngstown, Canton, Wilmington

SUBSIDIARIES: Adamson United Company, Akron, Ohio
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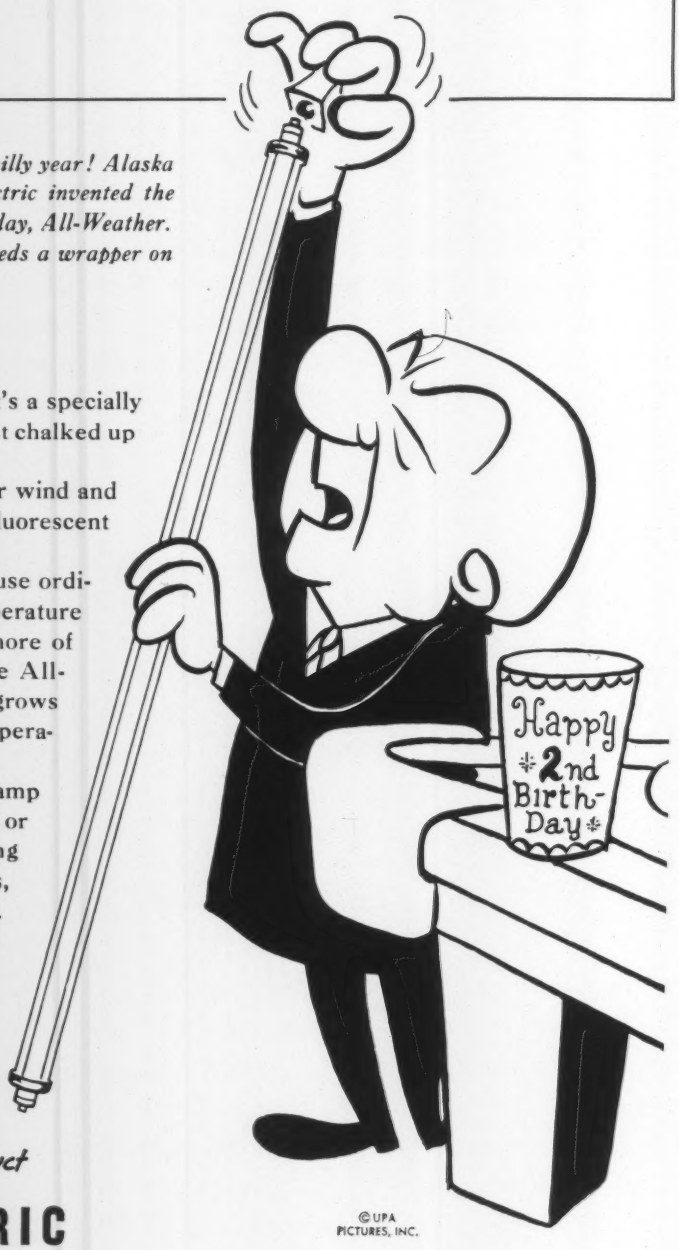
First from General Electric (1959)...another bright idea that became a better lamp for you

G-E All-Weather Fluorescents shine brighter when mercury drops

Mister Magoo says . . . "1959? A chilly year! Alaska joined the Union, and General Electric invented the All-Weather fluorescent. Happy birthday, All-Weather. Humph! Packaging experts! Who needs a wrapper on a pool cue?"



©UPA PICTURES, INC.

DON'T drop your cue, Mister Magoo. It's a specially jacketed All-Weather lamp, another first chalked up by General Electric.

It wears that glass jacket to ward off winter wind and cold. Below freezing, it's the most powerful fluorescent lamp you can buy.

General Electric developed this lamp because ordinary fluorescents grow dim when the temperature dives toward zero. Often they lose 90% or more of their warm-weather light output. But the All-Weather fluorescent T10J—a G-E exclusive—grows brighter the colder it gets! Use it where temperatures sometimes drop below 40°F.

You can use the T10J—or its companion lamp (T10) without the "storm window"—indoors or out. Examples: walk-in freezers, shopping centers, drive-ins, parking lots, street lamps, store fronts, airports, docks, signs, gas stations.

Both come in 4′, 6′, and 8′ lengths. Ask your G-E distributor to show you these two exclusive examples of General Electric lighting leadership. General Electric Co., Large Lamp Dept. C-111, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

How to Ease Business Cycles

Businesses, both individually and collectively, can ease the effects of business cycles.

Acting against the business cycle often makes good sense. Example: Making capital expenditures at other than periods of peak prosperity.

■ "People aren't seasonally adjusted." This comment, not original here, has been quoted and repeated wherever business analysts meet to discuss the economic picture. It applies particularly to adjusted figures of employment, unemployment, earnings, and other indicators that affect the individual.

Applied to industry, most companies have learned to live with the short-term, seasonal fluctuations. But the ups and downs of business cycles are still too much for many businesses to cope with. The recent recession had many sound businesses on the ropes. And many of them, where the recovery is late to arrive, are still in shaky condition.

It Can Be Done—Can business do anything to ease the hardships of these cycles, other than call for government aid?

A new report by the U. S. Chamber of Commerce, "Management Action to Promote Business Stability," says individual businesses can reduce the effects of severe cyclical changes on output, sales and earnings. And, if put into effect by a large number of companies, they can do a lot to reduce total effects of business cycles.

Some of the points suggested by the study are simply good business sense. By acting against the cycle, a business can frequently save money by simply getting a bargain.

Buy at Right Time—A simple example of this is buying a machine tool when business is at a low point for tool builders. The resulting good service, fast delivery, and probably a good price shouldn't tax the imagination of a company president. That is, if he's confident of coming out of a period of poor business into an uptrend.

Obviously, it's not easy for all companies to buck the cycle on all points. Many are too hard-hit in a recession period to step up their capital spending.

Time to Look Ahead—Nor do all companies employ sales and marketing research, or business forecasting staffs that give them the insight, and confidence, to make decisions of this nature.

Check This Positive Approach

Summing up, the report suggests these areas for positive action to meet economic fluctuations:

1. Pricing Policy and Sales Promotion—During slumps, strengthening advertising and selling programs, as well as changes in products and product mix to meet changes in demand, offer ways to build sales and resist cutbacks in production. . . . New products at attractive price levels may prevent depressive effects of anticipations of price cuts in old lines.

2. Innovation and Research—By continued innovation and expanded research on new products and market forces, businesses can aid themselves in preventing cutbacks and unemployment. Also, promotion in new domestic and export markets can promote stability.

3. Private Capital Outlays—It is in the interest of business firms, and investors, as well as in the general interest, to work towards less concentration of capital expansion in boom periods, and more intensive investment when costs decline during slumps. Long-run investment projects should be based primarily on the most reasonable long-term cost-benefit assessments that can be made, and not be influenced unduly by short-run trends.

4. Inventory Policy—The change in business inventories is the most volatile item affecting short-run conditions. Change in rate of accumulation or liquidation has effects throughout the entire economy and can precipitate or intensify longer-run cycles. Greater caution in building inventories when business is good, and, particularly, avoiding undue speculative increases, can go far in smoothing the effects.

5. Business and Economic Statistics—Improvement and adding to government business statistics and economic information can be helpful in inventory policies, capital investment, sales, and marketing.

6. Monetary and Fiscal Policy—Improvements in business management to help minimize cyclical changes makes sense when the government provides assurance of appropriate use of monetary and fiscal measures to avoid depression or inflation.

They "Go Together" For

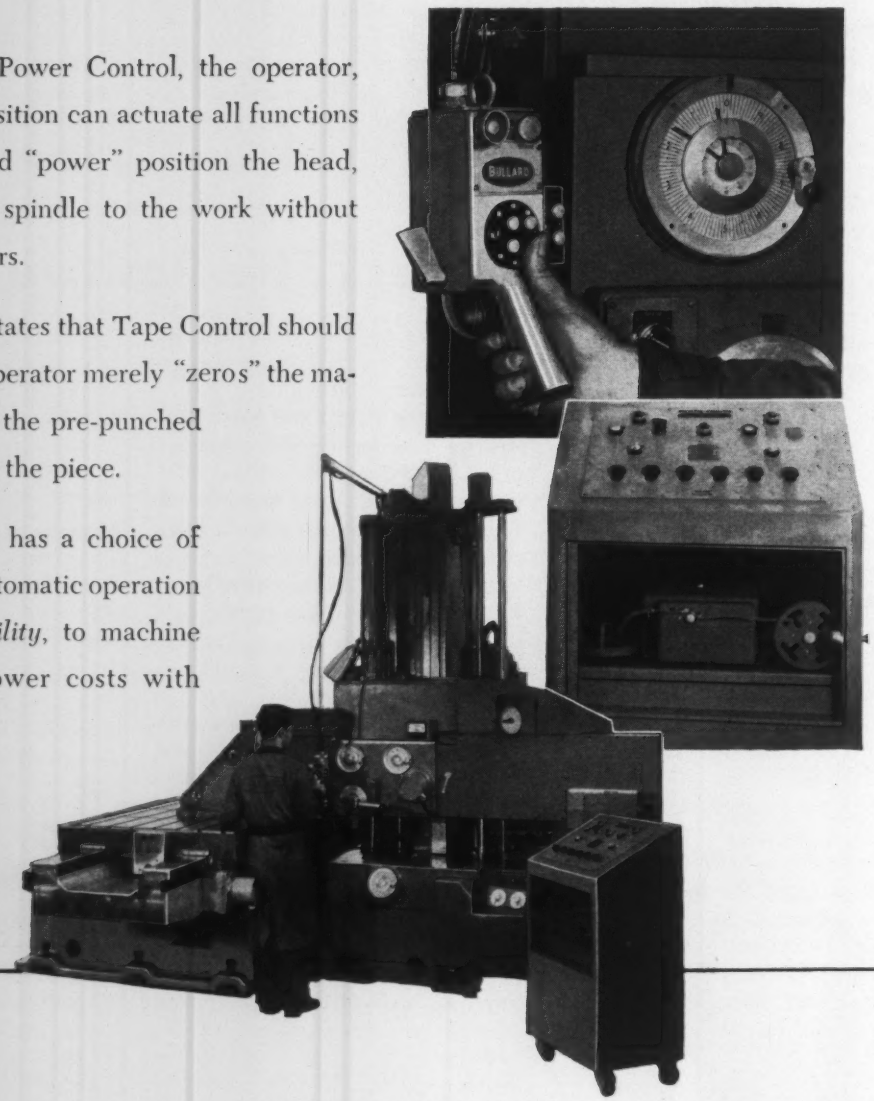
CENTRALIZED POWER CONTROL for manual operation and **NUMERICAL TAPE CONTROL** for automatic operation provide complete versatility of the Bullard DYNAMILL H.B.M. to insure maximum production.

Complete Versatility

With Centralized Power Control, the operator, from his normal position can actuate all functions of the machine and "power" position the head, table, saddle, and spindle to the work without hand cranks or levers.

When the work dictates that Tape Control should be employed, the operator merely "zeros" the machine according to the pre-punched tape for machining the piece.

Thus, the operator has a choice of either manual or automatic operation — *complete versatility*, to machine more pieces at lower costs with increased profits.



BULLARD

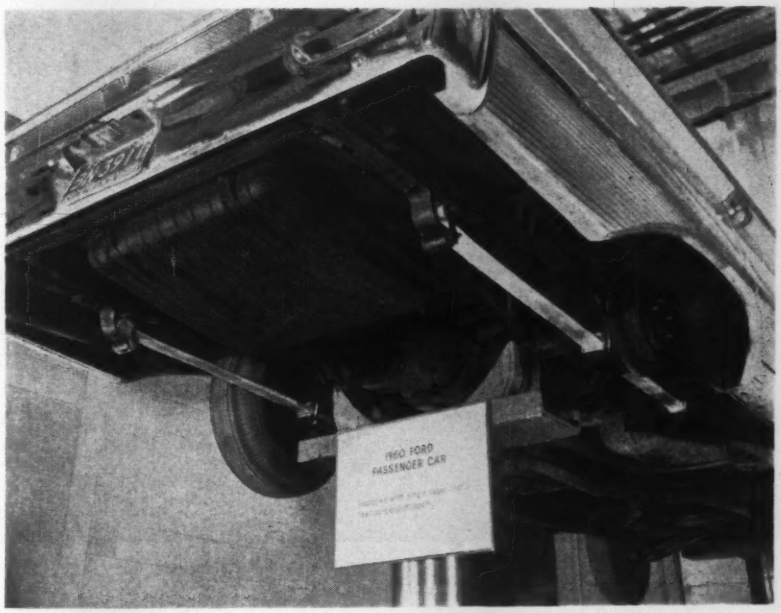
For Complete Information on the Bullard DYNAMILL H.B.M., call your nearest Bullard Sales Office or Distributor or write The Bullard Company, Bridgeport 9, Connecticut.

Single-Leaf Spring Due for '62

Chevy Adopts It for New Car, Others Consider It

Rear suspension systems are due for a change when the 1962 cars are introduced.

The new, in-between Chevy will use a single-leaf spring rather than coil or multi-leaf. If it works, others will follow. By A. E. Fleming



TAPER LEAF: This single-leaf spring will be used on at least one 1962 car. It is said to offer weight-saving and cost advantages.

▪ Attention will focus on suspension systems this fall.

Main attraction will be the single-leaf spring—a single piece of steel which some engineers believe may replace multi-leaf and coil-suspension systems.

Car and truck makers and suppliers have been developing the one piece spring for several years. Now some are taking steps to put it into production.

One for Chevy—Chevrolet takes the first step among car makers when it introduces a single-leaf spring on its new 114-in. wheelbase series of cars a couple months from now.

Others, among them Ford Motor Co. and Chrysler Corp., are toiling over their own versions. So are other divisions of General Motors Corp.

If Chevy's system proves adequate, competition can and will move swiftly to get their own units into production.

Automakers aren't the only ones active in this area. Rockwell-Standard Corp., says many of its customers are testing the "Taper-Leaf," its name for the single-leaf spring. The suspension is being tried on trailers and trucks, including front and rear axle applications.

Two for Trucks—A two leaf version of the R-S spring is in use as the suspension piece for the company's own tandem axles. Several hundred are in service.

In the past three years at least a half-dozen truck makers have made sample installations. R-S says there is every indication that before year end there will be a trend toward single leaf-springs on front suspensions for single rear axles as well as for larger tandem uses.

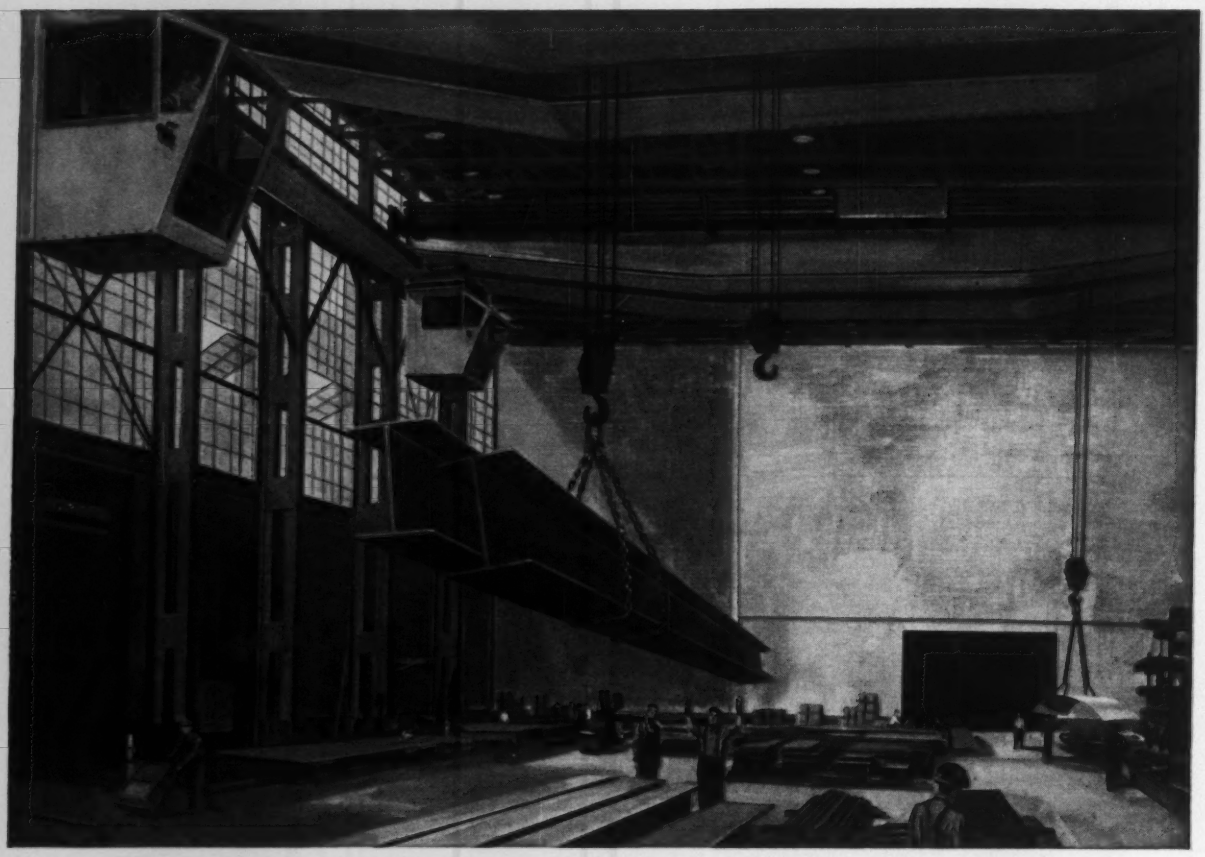
Lower Cost—For Chevrolet, material cost advantage wouldn't be too great since only rear coil springs are replaced. All GM cars except Corvette, with leaf springs in the rear, use coils.

But savings in steel cost would be noticeable for an automaker which switches from multi-leaf springs. Multi-leafs are used presently on all Chrysler Corp., Ford Motor Co. and Studebaker - Packard Corp. makes and the Rambler American.

Less Weight—Another advantage is weight savings, estimated to be 20 to 30 pct compared to multi-leaf springs on passenger cars, and up to several hundred pounds on big trucks.

Advocates also claim the single leaf shows better uniformity of performance. It is said to last two to three times longer. It can be produced for less. And it lends itself to automated manufacture because of its simplicity.

Possibility of more body noise and faster corrosion of the suspension section itself have been cited as potential minus factors. But Chrysler's torsion - bar and coil springs are one piece of steel.



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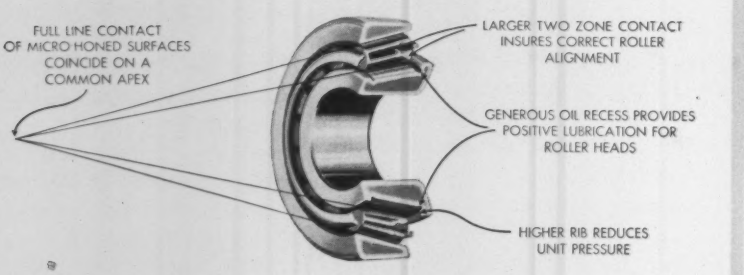
FULL LINE CONTACT OF MICRO HONED SURFACES COINCIDE ON A COMMON APEX
LARGER TWO ZONE CONTACT INSURES CORRECT ROLLER ALIGNMENT
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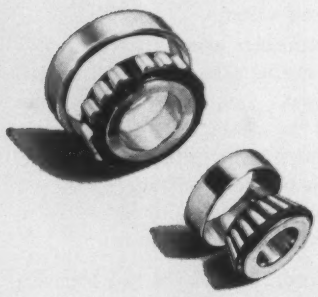
HIGHER RIB REDUCES UNIT PRESSURE



World Marketing Drive Urged

Conference Told of Competition Facing U. S.

American Marketing Assn. delegates faced up to competition from abroad.

More U.S. companies must join the 12,000 now selling overseas if the U.S. is to survive, the annual convention was told.
By R. R. Kay

■ "This country is losing the marketing battle on the world front. If it doesn't learn to compete worldwide, it'll lose its own markets at home."

That's the belief of Chris J. Witting, Westinghouse Electric vice-president. He spoke in Los Angeles at the American Marketing Assn.'s 44th National Conference.

Shrinking World—"The world is shrinking. We must learn to market on a one-world concept," says Mr. Witting. "This means competition with nations that have low labor costs, and now use the most modern manufacturing techniques."

It means we must explore virginal African and Near East markets. In 10 years, all of these countries will be important consumers, Mr. Witting says.

Major Decade—It's the rare industry that won't feel the full impact of the shrinking world within the next 5 to 10 years. Yet today, only 12,000 of 300,000 U. S. manufacturers sell abroad.

Mr. Witting hammered away at these points:

1. Let's stop fooling ourselves. We're in for the most active competition we've ever faced. We must do our homework. On-the-job ability isn't enough. Get into the field. Attend overseas trade shows. Study foreign publications.

2. Learn how foreign industry thinks, creates, adapts and markets. Don't shrug off the competition with "they imitate." They're not imitating any more—they innovating. And that spells trouble for us, now and in the future.

3. Realize that people are the same—and also that they're different. Not everybody thinks Americans are great. And if we take the attitude that we can learn, as well as teach, our marketing just might be that much sharper. Understand the drive for nationalism in other nations—and we'll prosper.

4. Study foreign products. See what makes them tick.

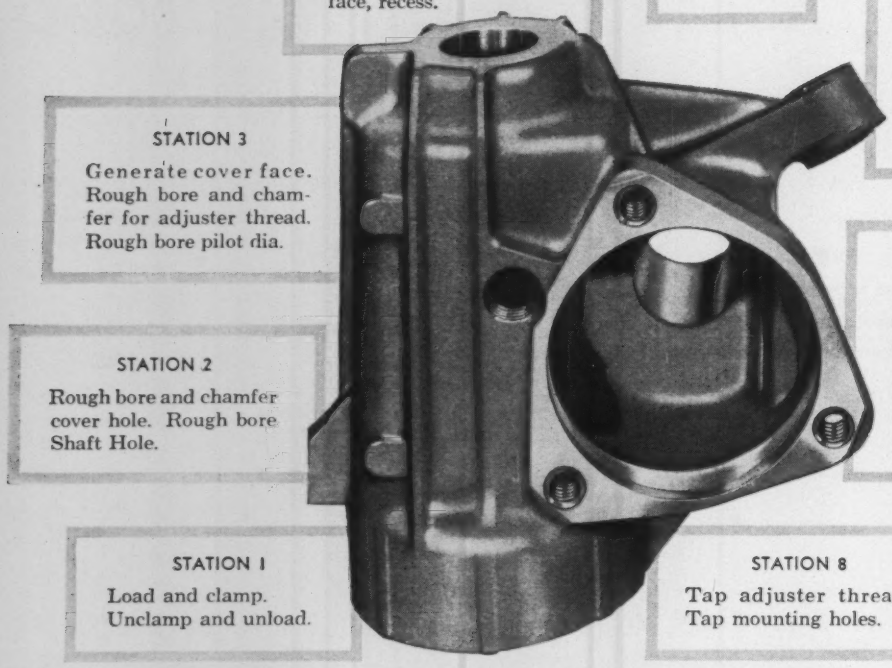
Dig Deeper—Mr. Witting says, "Let's not alibi with higher U. S. hourly rates. We must dig deeply into other factors that let foreign manufacturers undersell us."

Product design might be a profitable area to explore. We should design products with consumer needs in mind. "Quit gadgetry and concentrate on function," urges Mr. Witting.

"We must educate management to move marketing from the sales bullpen to the front line. Marketing must be considered the leading element in the struggle for company survival and growth," he insists.

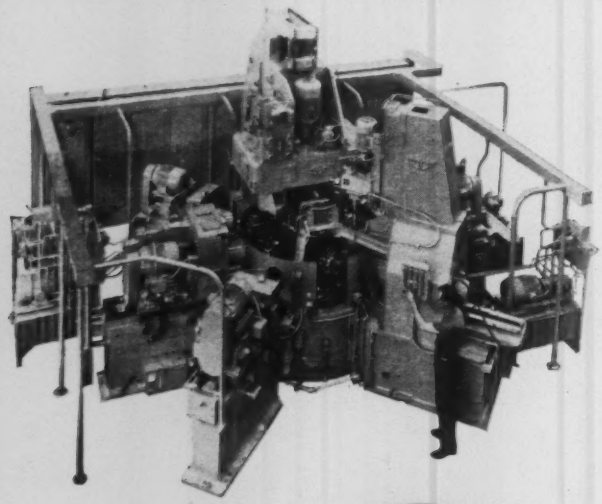
Audio-Visual Aids Speed up Production

CONTROLLED TEST: General Dynamics Corp. audio-visual operator at Pomona, Calif., observes slides on eye-level screen while listening to detailed description of assembly steps. Tests show audio-visual aids offer 40 pct gain in production time over multiple-tation, line-flow operation.


STATION 4
Semi-finish bore shaft hole and cover bore. Rough generate cylinder face, recess.
STATION 5
Idle.
STATION 6
Drill and countersink mounting holes. Semi-finish bore pilot hole, rough bore and chamfer bearing cup and seal diameters.
STATION 3
Generate cover face. Rough bore and chamfer for adjuster thread. Rough bore pilot dia.
STATION 7
Finish bore cover and shaft holes. Finish bump face side cover. Finish bore adjuster thread, pilot, bearing cup and seal diameters. Bump face cylinder.
STATION 2
Rough bore and chamfer cover hole. Rough bore Shaft Hole.
STATION 1
Load and clamp. Unclamp and unload.
STATION 8
Tap adjuster thread. Tap mounting holes.

153 Aluminum Steering Gear Housings per hour

automatically processed on this GREENLEE Machine



This Greenlee 8-Station Horizontal and Vertical Spindle Machine is establishing some excellent performance records for a leading automotive manufacturer. The 52 inch table carries 8 work fixtures. Each has power clamping. To insure rigidity and accuracy, the table is clamped hydraulically metal to metal. Indexing is fully automatic. Cycle time is 23.5 seconds. Like all Greenlee machines it's built for long, continuous service. Can be modified economically if desired. Have our representative give you complete information.

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Pooled Research Is Needed

Broad-Gage Program Would Benefit All Tool Builders

Alan Mattison, past president of NMTBA, calls for cooperative effort in basic research by machine tool builders.

It is needed to meet the changing domestic and foreign market challenge, he says.
By R. H. Eshelman

■ Machine tool builders must join now in basic research. This is the view of Alan Mattison, immediate past president of the National Machine Tool Builders Association. Cooperative research effort is needed, he says, to assure tool builders their continuing place as a key cog in the nation's economy.

Mr. Mattison points out that the industrial giants have the time and money to staff laboratories. These companies can undertake vast research and development programs. But the many middle-size and smaller companies in the machinery industry have only one avenue open. They must pool their efforts.

Big View—"Our world is changing fast," he asserts, "and has become an engineer's world." The president of Mattison Machine Works, Rockford, Ill., he speaks with practical authority of "competition that is no longer restricted to businesses and markets. It has become a factor in national prestige and world politics."

Citing specifics, he points out that labor rates here run roughly $3 an hour or more, compared with a maximum of about $1 an hour in Europe. So all American manufacturers are at a disadvantage in world markets, even here at home.

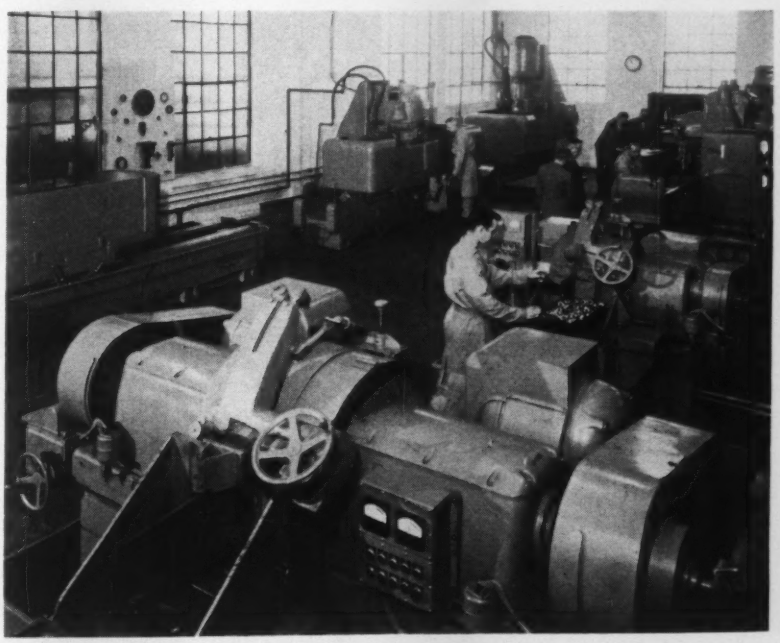
The lesson for engineers: "We must stop concentrating exclusively on mechanical things. We must see through things to their economic significance," he warns. "If we do not produce the machinery which makes American plants more competitive to foreign ones, then we are inviting a special kind of competition.

"This will be not just in price, but in the threat of superior products designed specifically for our markets and to solve our customers' economic problems.

"We need to get out of our rut," he says, "and peer ahead, if the effort is to be really worthwhile. We must have big breakthroughs, such as the original idea for wedding electronic computers to machines in numerical control."

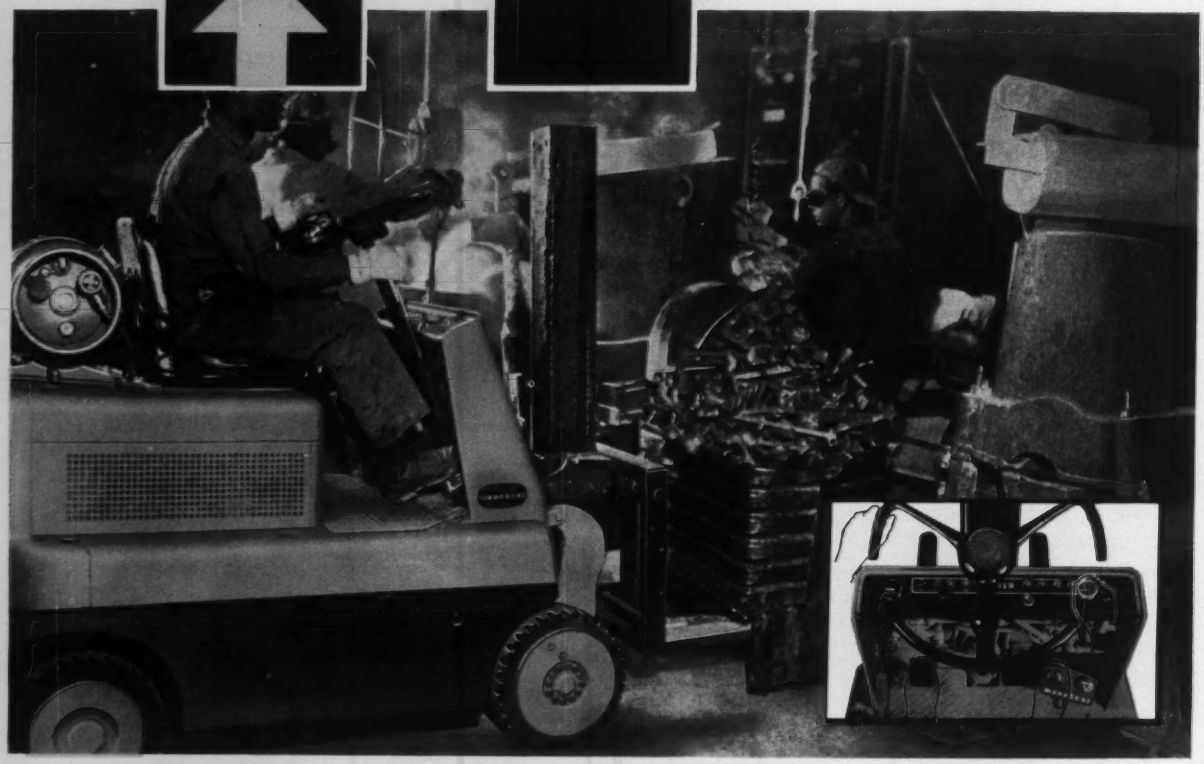
The Plan—How does he propose to do it? "Why not set aside 1/10th of 1 pct of all machine sales dollars for such research?" he asks. "We could start work immediately in existing organizations such as Armour, Battelle, Metcut, and the universities."

Visualizing practical details as well as the broad scope, he suggests grinding companies, for instance, could join in one program, etc. "But we must keep it broad-gaged," he warns, "and avoid proprietary problems in specific applications." Through such a massive complex of research and development, individual builders will in the end reap far more than they put in.



NEW SERVICE: For companies wishing to study production techniques, the Mattison Machine Works, Rockford, Ill., offers the services of this "Grinding Methods Laboratory." The lab duplicates field conditions in testing surface grinding tools, methods and techniques.

HYSTER



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INDUSTRIAL TRUCK DIVISION
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LaGrange Worthington, appointed vice president, sales promotion, Rolled Steel Corp.

Chicago Pneumatic Tool Co.—T. F. Noonan and C. L. Lane, elected vice presidents.

Hupp Corp.—F. W. Hottenroth, elected president; J. J. Lane, elected vice president, marketing; Jerome Belasky, elected vice president, manufacturing and engineering, Gemco, Inc., Div.

Jones & Laughlin Steel Corp.—J. C. Rosser, appointed assistant chief accountant, Pittsburgh Works.

Allegheny Ludlum Steel Corp.—G. L. Roark, appointed general manager, sales.

Cincinnati Steel Castings Co.—R. S. Ragan, elected vice president and a director.

Republic Steel Corp.—R. H. Henke, appointed manager, central alloy steel district; W. C. Schnackel, appointed manager, sales, Detroit.

Carpenter Steel Co.—R. F. Koch, named manager, sales service, Webb Wire Div.; W. A. Baumstark, named manager, sales, Alloy Tube Div.; W. A. Millard, named manager, Hartford-Providence mill branch; C. H. Harton, appointed manager, Florida district.

Caine Steel Co.—Gerald Wunderlich, named assistant to the general manager, Chicago Div.

Wheeling Steel Corp.—L. N. McCutcheon, named assistant manager, sheet and strip sales; J. E. Lally, Jr., named assistant manager, secondary products sales; L. C. Kemo, appointed plant superintendent, Benwood Works; N. W. Blakely, appointed assistant general manager, Yorkville Works; G. M. Yocom, appointed assistant to the vice president, operations-steelmaking practices.

National Steel Corp.—J. G. Redline, appointed superintendent, cold reduction and sheet finishing dept., Midwest Steel Div.

Solar Steel Corp.—H. D. Curtis, appointed manager, Detroit Div.

D. E. Baker, appointed vice president and a member of the board, Androform Industries, Inc.

Colorado Fuel & Iron Corp.—R. W. Freeman, appointed wire metallurgist, Buffalo plant; T. F. Flemming, appointed acting plant manager, Birdsboro, Pa.; N. H. Nordby, appointed assistant sales manager, Boise, Ida., district; T. D. Guy, appointed assistant sales manager, northern California district; F. M. Barry, appointed sales manager, northern California district.

Ingalls Iron Works Co.—J. B. Kopp, elected president; M. H. Osburn, elected treasurer; J. P. Bradford, elected secretary.

(Continued on P. 64)

C. S. Mertler, appointed vice president, engineering, Stevens Manufacturing Co.

J. A. Manders, appointed vice president, manufacturing, Burgmaster Corp.

A. P. Stern, appointed director, engineering, Electronics Div., Martin Co.

McKAY DIE SHEAR LINES CUT MORE THAN STEEL. The most economical and efficient shear lines in operation today, they are being used by dozens of leading metal producers, fabricators and warehouses to slash shearing costs. Here, McKay Sales Manager Joseph F. Lyden, Jr., and M. G. Slaney, Building Division Manager, The Parkersburg (W. Va.) Rig and Reel Company — one of the nation's fastest growing manufacturers of pre-engineered metal buildings — examine panel sections cut to length by the high speed McKay Die Shear Line in the background.

This is McKay

Photo by Arnold Newman

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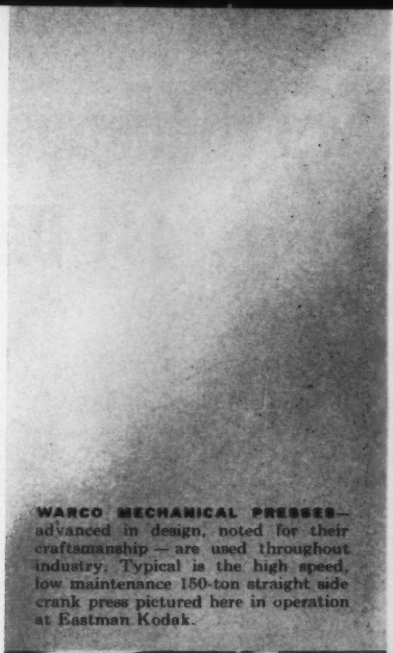
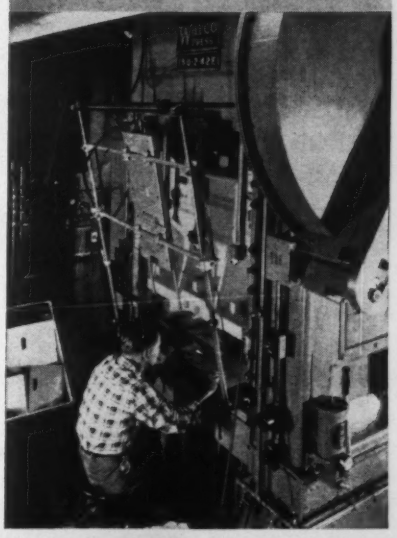
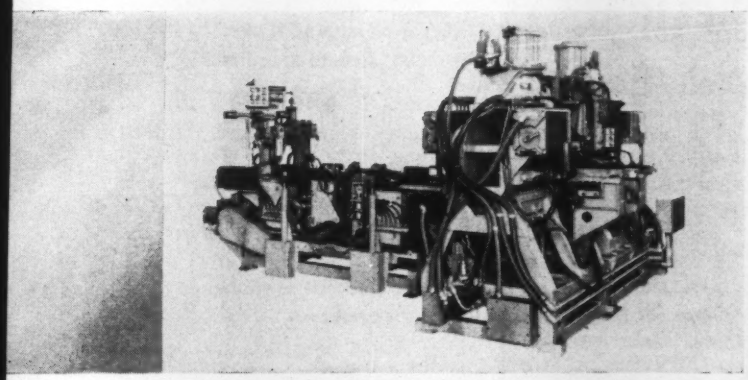


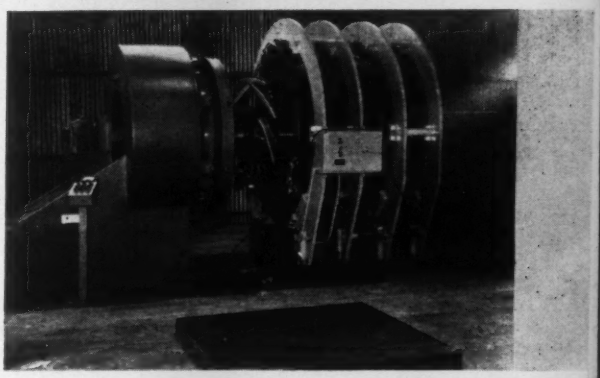
WARCO MECHANICAL PRESSES—advanced in design, noted for their craftsmanship—are used throughout industry. Typical is the high speed, low maintenance 150-ton straight side crank press pictured here in operation at Eastman Kodak.





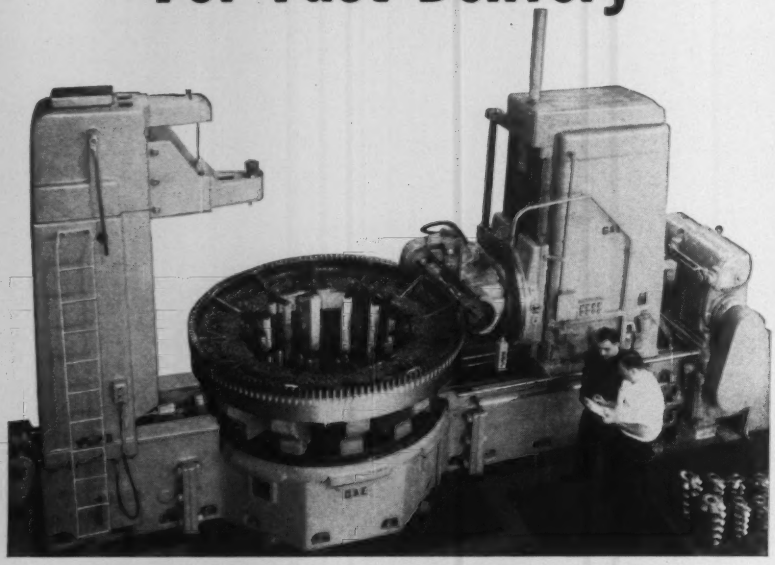
FEDERAL RESISTANCE WELDERS AND WELDING LINES, like this multi-gun combination spot and projection welder used by Hotpoint on their range production line, can be found in the plants of leading metalworking firms the nation over. Individual units, or complete resistance welding lines, are engineered to specifications by McKay's Federal-Warco Division.

LOOK TO McKAY MACHINE



BERKELEY-DAVIS AUTOMATIC ARC WELDING MACHINERY produced by Berkeley-Davis, Inc., a subsidiary, is highly popular in the aircraft, rocket, automotive and appliance industries. The rocket body welder pictured here is working at Aerojet General, subsidiary of General Tire and Rubber Company.

New Production Capacity For Fast Delivery



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(Continued from P. 61)

Union Carbide Corp.—G. H. Shelton, appointed works manager, Haynes Stellite Co. Div.

Inland Steel Products Co.—T. R. Laidlaw, appointed purchasing agent.

Carborundum Co.—R. W. Lear, appointed vice president, marketing.

Allvac Metals Co. — B. D. Bowen, named technical consultant.

Chase Brass & Copper Co.—W. F. Aylard, named vice president.

Blaw-Knox Co.—E. R. Bellows, appointed manager, eastern castings sales, Foundry & Mill Machinery Group.

Climax Molybdenum Co.—J. W. Groth, appointed manager, foundry sales.

EDP Div., Minneapolis - Honeywell Regulator Co.—Dr. J. E. Smith and J. R. Lenox, appointed vice presidents; R. H. Bloch, named director, product planning; Dr. R. F. Clippinger, technical advisor.

Aerojet-General Corp. — B. F. Rose, Jr., elected vice president.

Bartlett-Snow-Pacific Co.—J. W. Hill, named plant manager, Bartlett-Snow Div.

Motec Industries, Inc. — G. D. Dodson, named director, parts and service div.; A. E. Smith, named director, merchandising and customer services div.

Allis - Chalmers Manufacturing Co.—C. W. Parker, Jr., named general marketing manager, new products dept.; J. M. Duncan, appointed manager, north central region; C. F. O'Riordan, appointed general manager, Defense Products Div.

H. M. Harper Co.—James Fairbairn, appointed director of purchases.

General Automation Manufacturing, Inc.—R. R. McLeese, elected president; R. S. Ebbert, elected vice president, marketing; H. C. Ovshinsky, elected vice president, engineering and manufacturing.

D. W. Roberts, named president, Wire Reinforcement Institute.

John Somerset, named vice president, Gleason Works, Rumrill Co.

Taylor Fibre Co.—G. J. Muller, named manager, special projects group.

American Enka Corp. — J. R. Garey, appointed general manager, Gardena, Calif., plant, Brand-Rex Div.

Pittsburgh Chemical Co.—W. E. Hudson, appointed manager, sales, Protective Coatings Div.

Ceilcote Co.—G. H. Burnside, named general sales manager.

Pittsburgh Metals Purifying Co. —Donald Burtner, named manager, quality control; John Hill, named sales engineer.

Mechanical Specialties Co. — R. S. Howland, appointed shop superintendent.

Metals & Controls, Inc.—R. R. Kondrat, appointed manager, industrial products, Nuclear Products Group.

Hancock Telecontrol Corp. — J. S. McLean, named Detroit district manager.

Clark Bros. Co.—J. D. Gilbride, appointed California district manager.

Sheffer Corp.—J. C. Caveman, appointed assistant sales manager.

American Brake Shoe Co.—L. M. Krebs, appointed manager, Michigan district, Denison Engineering Div.

Misco Precision Castings Co.—N. G. Lirones, appointed development project engineer.

Electric Storage Battery Co.—H. J. Ulkloss, Jr., elected treasurer.

Curtiss-Wright Corp.—N. J. Novotney, named sales administration manager, Metals Processing Div.

Astron Corp.—Louis Kahn, appointed vice president, engineering.

George Fry & Associates—A. H. Foster, appointed director, management services, eastern div.

Towne Robinson Nut Co.—F. S. Napoli, appointed plant manager.

Threadwell Tap & Die Co.—Walter Marek, named Chicago district sales manager.

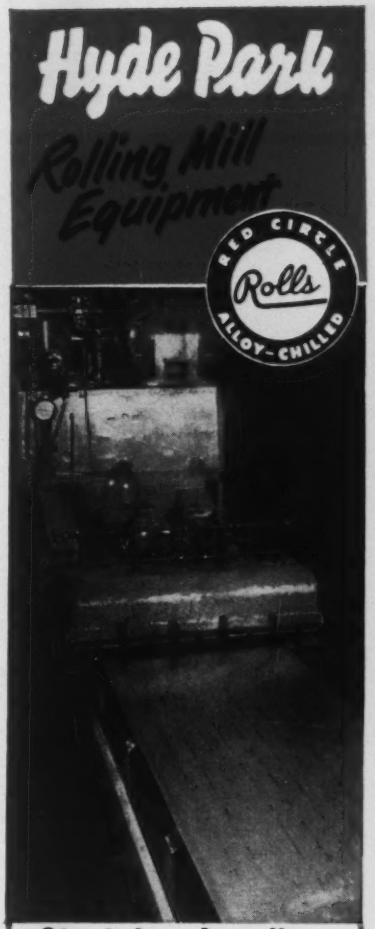
Yale & Towne Manufacturing Co.—Roy Perler, appointed manager, New York Sales and Service Branch.

Indiana General Corp.—Alexander Elovic, named manager, advanced development, General Ceramics Div.

Glidden Co. — R. B. Quelos, named general sales manager—pigments and colors, Chemicals Div.; J. C. Rankin, named general sales manager — metals and organic chemicals, Chemicals Div.

OBITUARY

William K. Hahn, Jr., president, Pittsburgh Tube Co.



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STEELECTOR PROGRAM

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Who Should Own Satellite?

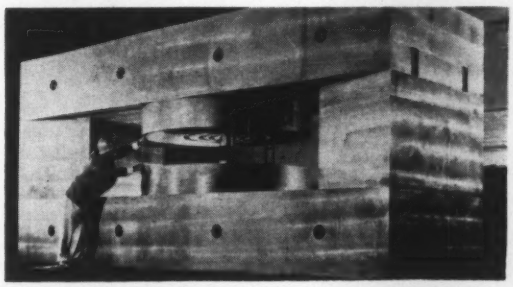
The Federal Space Council will soon decide whether communications-satellite systems should be owned by the federal government, private industry or a combination of the two. This Council, headed by Vice President Johnson, is making a complete study of all proposed systems. President Kennedy says these communications systems must meet both private and government needs.

Ready Moon Batteries

Well on the way is a new type of battery that supplies continuous power up to 18 months. It may play a key role in vehicular space travel. Using sealed silver-zinc cells, this secondary-power source activates signaling devices when solar sources aren't available. All cells are hermetically sealed to operate in a vacuum.

Largest Atom Smasher

Fourteen huge blocks of precision-machined solid steel will permit nuclear explorations never before possible. These 14 pieces, each weighing from 12-21 tons, make up a magnet core—heart



CYCLOTRON'S HEART: Weighs 275 tons.

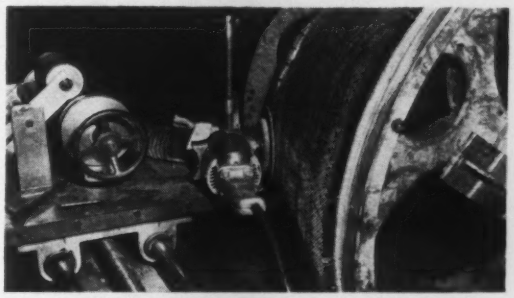
of a new 88-in. cyclotron. The new atom smasher will be of novel spiral-ridge design. Some million-billion particles per second will stream out of the instrument sometime in 1962.

Egg-Shell Armor Plate

Tests prove that a thin skin from 0.01-0.125 in. thick can protect a space ship from meteroids. Thus it's possible to reduce space-probe wall weights by 50 pct. More than 300 pellets have been blasted at 13,000 mph into space-vehicle-skin mockups. Egg-shell shielding dissipates enough of the projectiles' energy to permit only mild pitting. At high velocities, projectiles shatter against these thin armor-plate shields.

Skirt Covers Titan Engine

Successful development of an ablative skirt for second-stage Titan missile engines yields a new use for nonmetallic materials on large liquid-rocket engines. The skirt allows "dry-jacket" en-



AFTER CURE: Tapes are cut to size.

gine starts. Such starts eliminate the potential hazard of propellent-mixture leakage in the combustion chamber prior to ignition. Each skirt consists of laminated asbestos covered with hair-felt and glass-contour tapes.

Balloon Bounces Signals

Space beacons, launched by satellites, will set up worldwide radio and television communications. Several beacon sources are being checked out for possible use. One is a huge balloon that can bounce radio signals back to earth. Another takes the form of an orbiting relay station. This station will record signals thrown into space and play them back to earth on command.

Dependable Missiles

The last in a series of Redstone missiles was fired last week at Cape Canaveral. This launching, a final-qualification test, concludes a program of evaluating and updating production components. The 30-ton liquid-fueled weapon has been in the hands of Army troops since 1958. Redstone boosters, modified as space-launch vehicles, helped to send Commander Alan Shepard on his historic flight into space.

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Cold Forging Blasts Barriers

Integrated Lines Speed Chipless Production of Auto Parts

Early cold-forging attempts haven't all been successful. Too often, a company bogged down in a maze of obstacles.

Barriers are melting away as mushrooming applications roll over initial-development kinks.

By **R. H. Eshelman,**
Machinery Editor

■ There's a growing trend toward chipless machining. Waste in any form can't be tolerated. This also applies to purchased metal that's cut off and discarded while forming a desired shape.

In the vanguard of chipless-forming methods is the cold-extrusion process. Many companies have tried to shape a few parts by cold extrusion or cold forging. Others admire the possibilities from afar.

Everyone would like to use optimum metalworking methods. But cautious design and production engineers are content to let someone else iron out costly development kinks.

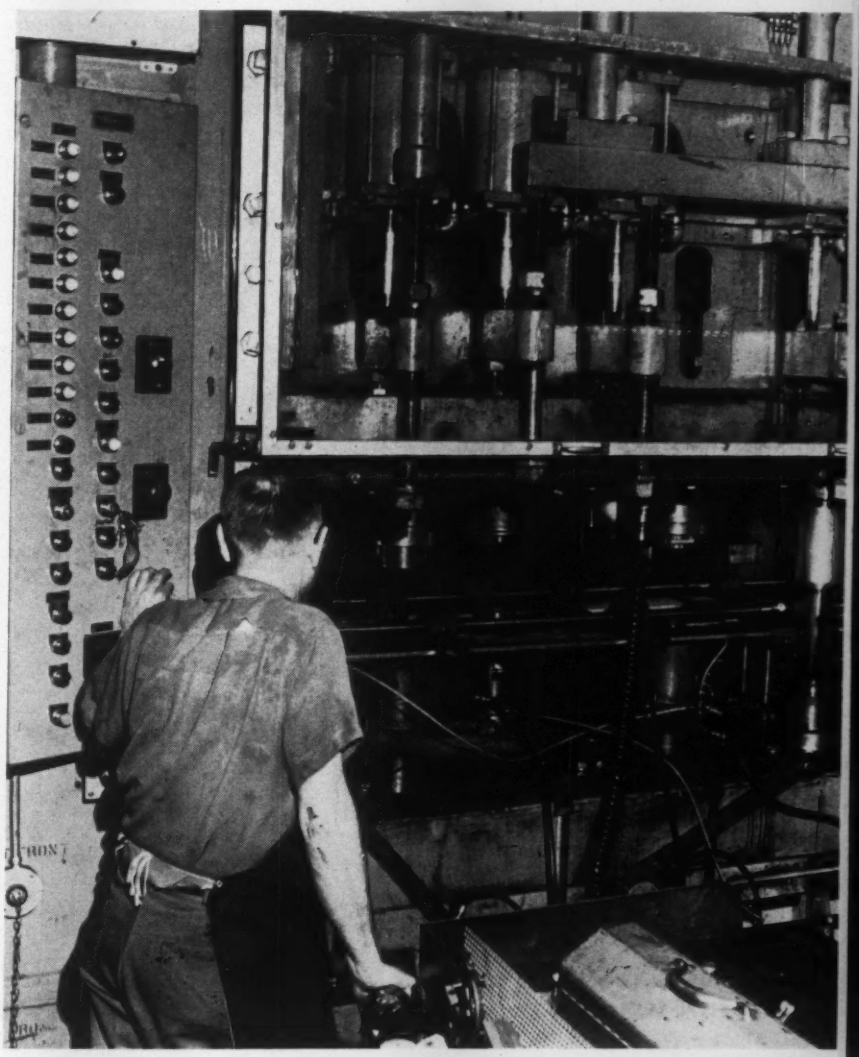
Obstacles Fade—Early cold-forging attempts haven't always been successful. Lack of information, doubts about specific applications, tooling problems and equipment costs pose barriers.

Now, led by General Motor's Saginaw Steering Gear Div., Saginaw, Mich., the trend toward cold forging is gaining momentum. Barriers are melting away as mushrooming applications roll over early obstacles.

W. H. Doerfner, general mgr. of the Saginaw plant, states: "We are increasingly interested in cold extrusion — a proven production process. It helps us solve modern design problems that demand ever-greater reliability and quality at lower costs."

At present, production runs at this GM plant center on nine totally-different cold-forged parts. One of these parts is a bearing cup. It's made in a variety of sizes.

Mass Production—Some universal-joint shafts use as many as 16



MECHANIZED FLOW: Tooled for transfer operations, a new cold-extrusion line uses a five-stage die to turn out automobile ball-joint housings with cup-like shapes.

bearing cups on a single assembly. This means that total production can run into millions of parts per year.

On the other hand, due to the many options offered by auto manufacturers, some monthly outputs may only be measured in hundreds of parts. Thus, bearing cup fabrication often takes the form of job-lot work.

Basically, the cold-extrusion process is a high-volume operation. As with most chipless-forming methods, its main advantage hinges on optimum material utilization.

"You always aim to save metal in cold forming," says J. E. Godfrey, Saginaw Div. works mgr. "But," he adds, "there are other nice side bonuses that go along with cold forging." These include improved quality, simplified processing and/or fewer separate operations."

Boosts Strength—With mounting emphasis on reliability, the grain-flow pattern in a cold-formed part offers another big bonus. By not cutting off grain fibers, you gain stronger parts. Mechanical-strength properties climb as the grain flow follows the cold-forming punch contours.

In most cases, cold forgings need very little, if any, finish grinding or follow-up machining. As a result, most of the work-hardened surfaces remain intact. This is a distinct advantage for the bearing cups.

Tests prove that the extruded cups don't break around the bottom openings. Previously, when the cups were machined from bar stock, breakage was a major problem.

Proper Planning — A ball-joint housing serves as another example of added strength through cold extrusion. This housing also shows the advantages of proper planning in design stages.

With cold forgings it's possible to make maximum use of as-forged features. Quite often, two or more pieces can be combined. This simplifies assembly work. It also boosts the overall strength of extruded housings by providing an unbroken grain flow and eliminating local stresses created by fasteners.

On the high-production bearing cups, work starts with coiled wire up to ¾ in. in diameter. A special high-speed header handles this wire stock. It cuts, coins and cold forms the forging slugs at 180 stroke-per-minute rates.

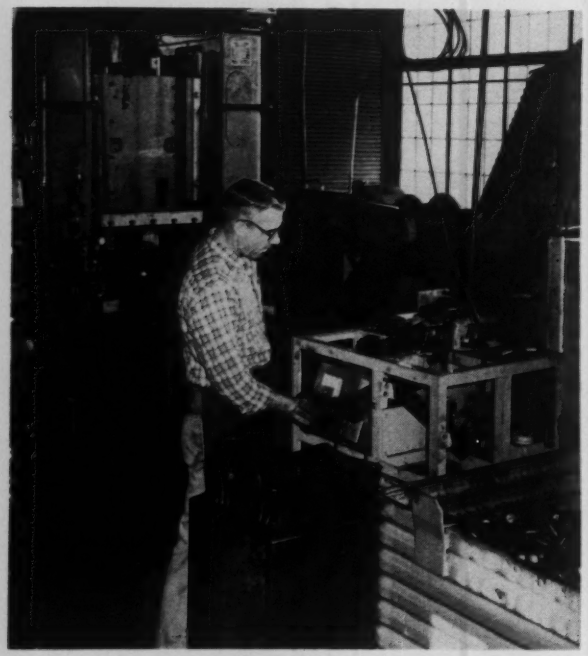
Quick Lube Job—Next, a chute carries each slug into an automatic annealing furnace. Passing out of the furnace, every slug enters a phosphate coater. During extrusion, these phosphate coatings preclude metal-to-metal contact.

A small conveyor pipes the coated slugs directly into the extrusion press. Hoppers on the back of the press feed on each side. This insures a duplicate, balanced operation on both halves of the circular-indexing die.

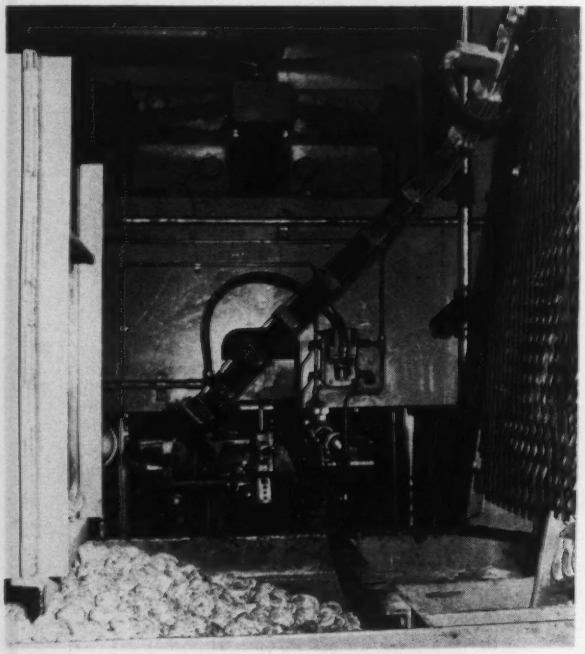
Loading takes place at the first station of these dial-type dies. As the slugs index through the press, they're extruded into cup shapes; then hit for a counterbore.

To obtain maximum working-die space, a mechanical drive indexes each die on the outside of the dial. This allows other types of work-pieces to be handled. It also speeds bearing-cup design changeovers.

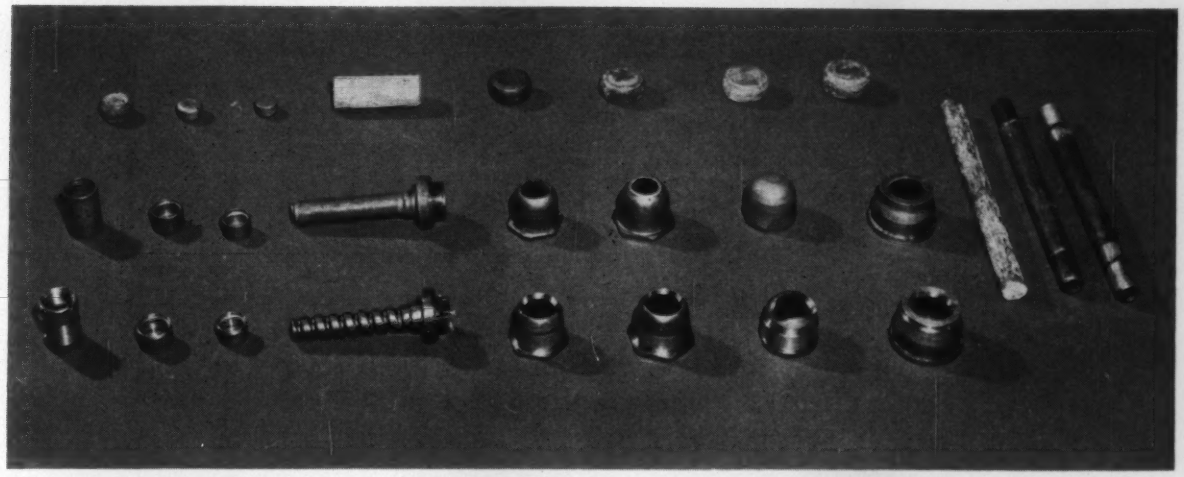
Evolution's Role — The current



GAGES WEIGHT: Electronic scale weighs sheared blanks. These blanks are extruded into gear shapes.



LOAD AND FEED: Bulk hopper keeps zig-zag elevator feeder (right) full of preformed forging blanks.



TYPICAL PARTS: Cold-formed parts include cups, worm gears, ball-joint housings and stepped shafts.

setup represents an improvement over the first forged cups. It gives better punch life because the counterbore strike has been separated from the forming strokes.

Every part shape has its own particular problems. With one shape, the biggest problem may center on punch scoring. In forming other complex shapes, problems include die breakage and loading or transfer snags.

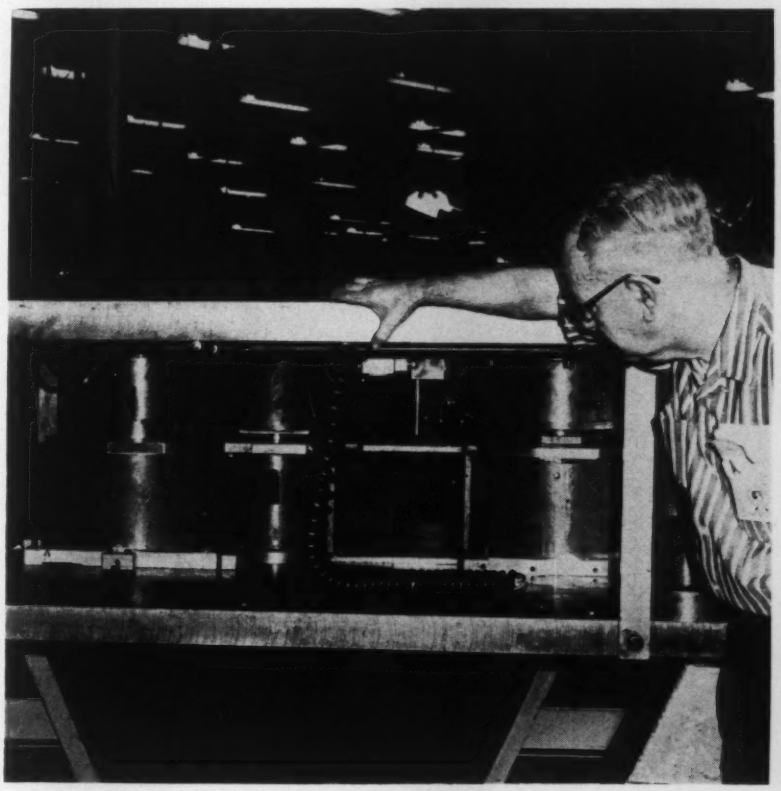
With the ball-joint housings all operations move straight through from one side of the press to the other. A 1000-ton double-eccentric-geared press, made by the Verson Allsteel Press Co., Chicago, was specially designed for this work. It operates at 26 strokes per minute.

Four in One—This press uses a five-station transfer die with a built-in feed. For easy design changeovers, the die can be removed without tearing out the transfer device.

Four versions of the ball-joint housing run through two sets of dies on the same press. The first station extrudes cup-like shapes. Then the second station detects broken punches.

Piercing of the cup-bottom holes takes place in the third station. In the next station, a coining operation forms a hexagon shape on the flange. The inner and outer diameter of each bottom radius is also coined at the fourth station. This insures good bearing surfaces.

Coining, of course, makes a mess of the holes pierced at station three. The fifth station handles repiercing of each of the cup-bottom holes.



MULTI-STATION DIE: A built-in transfer device in the cold-extrusion setup allows fast changeovers. Every workrun has its own die setup.

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Ask for Reprint **No. 189**

Metal Stampings Gain Toughness From Automatic Austempering

By **Ray Howland,** President, Eastern Tool and Stamping Co., Saugus, Mass.

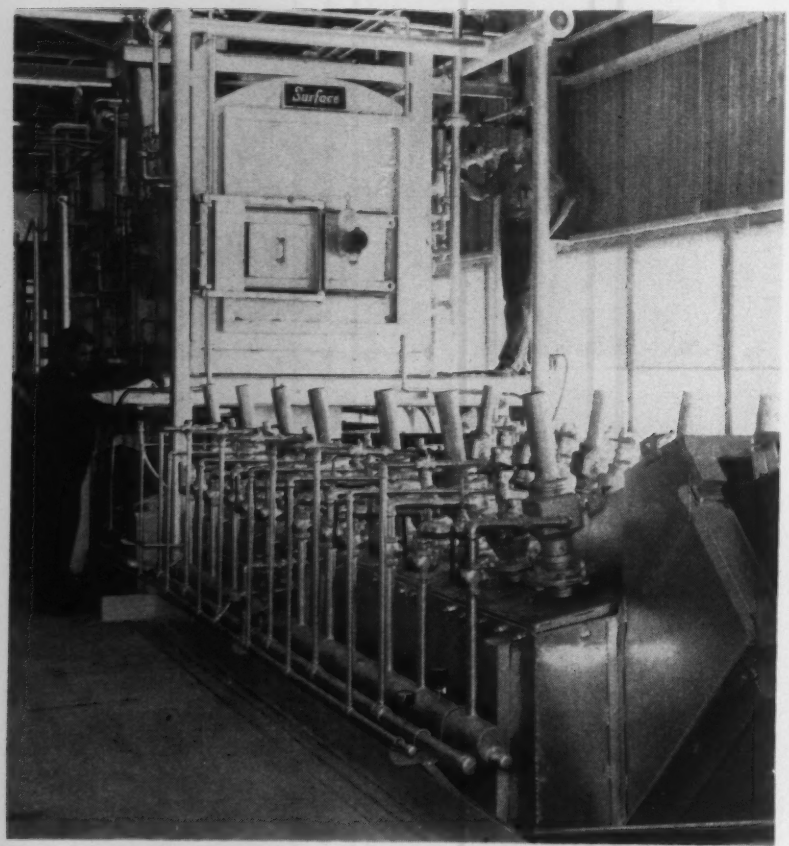
The small shops that send out their heat-treat work often run the risk of shipping delays.

Why not look into automatic austempering? It's a fast, compact method to harden parts.

■ Metal stampings often require a heat-treat cycle to bring them into the desired hardness range. Since stampings are generally less than ¼ in. thick, an austempering cycle can produce the right combination of toughness and hardness.

Eastern Tool and Stamping Co., Saugus, Mass., has cut manufacturing costs, boosted product quality and improved delivery by installing a continuous austempering line.

The heat-treat line includes a continuous belt furnace for austenitizing and a belt-type austempering salt bath. Both units were built by Surface Combustion Div., Midland-Ross Corp., Toledo. The heat-treating and handling machinery covers a space 50 ft long by 8 ft wide by 16 ft high.



SETTING UP SHOP: Enclosed unit uses eductor-type radiant tubes to heat the atmosphere furnace and preheat or cool the austempering salt bath.

Clean Operation—Because of the cleanliness of the heat-treating equipment and the low level of heat loss, the austempering setup was installed right in the manufacturing area. By so doing, the heat-treating operation is in proper relation to the material flow pattern of the plant.

The continuous belt furnace's eductor-type burners permit complete and clean combustion. This eliminates smoke and fumes.

The furnace belt is completely enclosed. This feature makes it possible to have a small opening at the loading end. Heat and furnace-atmosphere gases are thus prevented from escaping into the work area.

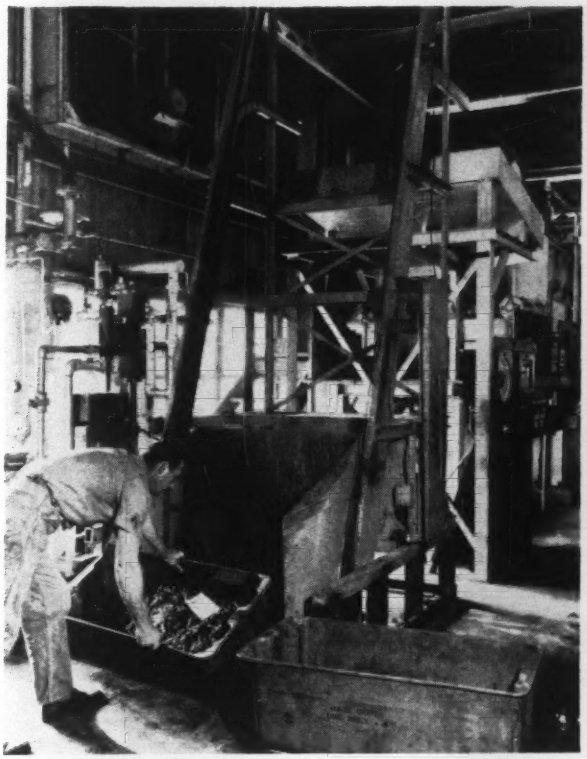
Even Heating—Because the alloy belt is completely enclosed within the furnace, it remains at uniform temperature. The constant temperature protects the alloy from thermal fatigue and insures much longer belt life.

The furnace is on a platform about 4 ft off the floor. Thus, the heat coming from the furnace eductors is above normal work level and places it close to the high ceiling of the building where it is ducted through the roof.

Since the furnace is at such a high level, it's possible to have a long quench chute. This keeps austempering fumes from reaching the inside of the furnace.

Out of the Way—The austempering bath is placed in a pit 6-ft deep. It stands about 2 ft above the floor and is 18 ft long. A steel cover encloses the top of the bath.

Thirteen eductor radiant tubes



ON THE WAY: Stampings are placed in a fiber-glass box and then elevated to a table in front of the furnace.

RIDES RIGHT IN: The operator places the stampings in a vibrator-feed system. Sequence is then automatic.

preheat the bath. As the bath temperature begins to rise during the quench, the eductors function as coolers. Room-temperature air is passed through the tubes keeping the bath temperature constant.

The alloy belt conveyor carries the work from the quench chute through the bath and on to a washing and drying cycle. Since the work emerges from the austempering bath at the required hardness, no draw furnace is needed.

Hits the System—Eastern moves its stampings in fiber-glass work boxes. The boxes, equipped with small rubber casters, roll on the shop floor from station to station.

Boxes filled with parts to be heat treated are then brought to the charging end of the austempering furnace. At this point the work box is placed on an elevator platform and locked in.

The operator, who is stationed on a platform 6 ft above the floor, starts the lift device. This raises the loaded box and dumps its contents onto a charge table in front of the furnace. The empty work box is automatically returned to the floor.

Shaky Feed—A vibrator in front of the furnace shakes the work onto the furnace belt. Because the work sometimes tangles, the operator feeds the vibrator by hand. The belt carries the work through the furnace.

At the end of the furnace, stampings drop through a quench chute onto the austempering bath belt. Once quenching is completed, work passes through a wash and drying cycle. The clean parts then fall into work boxes and are removed for further processing and shipment.

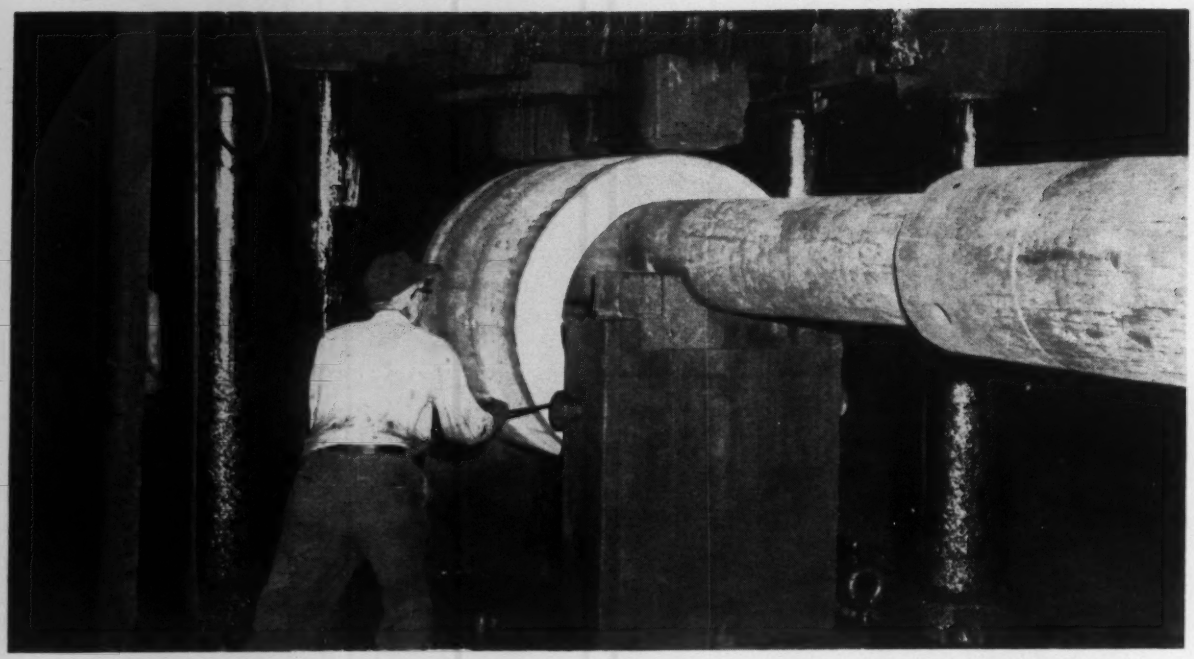
Safety Shoe — Toe caps and shanks are made of 0.50 to 0.60 pct carbon steel, .054 in. thick. But they both require different finished hardnesses. Shanks are heated to 1500°F and toes to 1580°F.

Toe caps are held to 45-48 Rc by quenching at 620°F. Quench time is about 24 minutes. Shanks are quenched at 615°F and produce a hardness of 46 to 50 Rc. Production is 650 to 675 pounds per hour on both stampings.

Two-Man Job — Furnace temperatures and speeds are varied to meet any conditions needed to produce all other parts. Two men operate the complete line, including the washer and dryer. One man loads the furnace. The other handles the discharge end of the line.

The austempering setup has cut material handling considerably. Previously, toe caps were sent outside to commercial heat treaters. This entailed a certain amount of delay and it was difficult to maintain control of production schedules.

By processing this work with their own equipment, the company has more rigid control over their entire manufacturing cycle.



LOOSE-MANDREL FORGING: Outside diameter of 47 in. is reduced to 40 in. using loose-mandrel forging.

Two Mandrel Forging Methods Shape Aluminum Cylinders

By **C. H. Maak**—Metallurgical Engineer, Sandia Corp., Albuquerque, N. M.

A unique combination of forging methods adds speed and quality to the production of seamless aluminum cylinders.

The methods tackle mechanical properties from all sides.

■ Two forging methods can be used together to produce long, seamless cylinders in high-strength aluminum alloys. The trick is to combine the loose- and tight-mandrel forging techniques.

The loose-mandrel method offers maximum work and better mechanical properties in the circumferential direction. Tight-mandrel forging, on the other hand, imparts greatest work and improved properties in the axial direction. End result is very good properties in both directions. Also, radial properties are even excellent.

At the Standard Steel Works Div. of Baldwin-Lima-Hamilton Corp., Burnham, Pa., a cylinder of 7079 aluminum alloy has been forged by these two methods. The finished cylinder is 100 in. long. It has an OD of 39¾ in. and a wall thickness of 5¾ in. It's the largest mandrel forging ever made from an aluminum alloy.

Three such forgings were produced. Tooling charges were negligible. Starting stock was a 32-in. diam scalped ingot. The producer has shaped the ingot into a 36-in. diam, 69-in. long section.

Starting Point—At Standard Steel Works, the ingot was first upset to 40 in. in diameter and 40 in. long. It was then bored to an ID of 12½ in. At this point, wall thickness was 17¼ in. Forging was done between 675° and 800°F.

The table reveals the mechanical properties of the three forgings as determined from end portions which had been sawed into 1-in. thick slabs. These slabs had also been solution treated and aged to the T6 temper.

Readings were also taken from a 3½-in. wide ring cut from one

FIRST FOR ALUMINUM: Tight-mandrel forging method increases part length without changing the diameter.

end of each forging. These samples had been machined to a wall thickness of about one inch. As in the prior lot, samples were solution treated and aged to T6 temper. Results here are equally promising.

Two Reasons Why—The big reward in forging aluminum alloys by this method is twofold. First, seamless forgings can be produced within a short period of time. The other benefit can be found in the superior mechanical properties of the forging itself.

Aren't material and processing costs high? The cost per pound of mandrel forging is quite moderate if you compare it with tooling costs involved in producing forgings of like quality by other methods.

The main disadvantage is that tight mandrel forging isn't practical on thin wall thicknesses. Here more machining is required than is generally needed with some highly specialized methods.

See It Often — Loose-mandrel working of narrow rings is a common practice. It consists of hot working alternately the wall of a ring or short cylinder supported on a mandrel. By rotating the ring to a new position on the mandrel, you begin to get a decrease in wall thickness and an increase in diameter.

Apparently, tight-mandrel forging to date has had but one use: The forging of long, seamless steel cylinders. This forging method consists of hot reducing a heavy wall cylinder whose inside diameter is filled with a "tight" mandrel.

Curved dies (both upper and lower) are used in preference to flat dies. Such work results in an increase in part length without any change in diameter.

Proof Is in the Properties

Tensile Properties of Three 5¾-in. Wall Forgings
(Determined from Heat-Treated One-inch Thick Slabs)

Direction	Number of Tensile Specimens*		Tensile Ultimate Strength, ksi	Tensile Yield Strength (0.2 pct offset), ksi	Elongation, pct
Axial	12	Min	74.0	62.0	10.7
		Max	79.4	67.9	15.7
		Average	77.1	65.3	13.2
Tangential	12	Min	75.0	62.2	10.7
		Max	81.6	70.9	15.0
		Average	78.1	66.4	12.4
Radial	14	Min	73.6	64.6	7.8
		Max	77.7	66.8	10.0
		Average	76.4	65.4	9.0

* Gage section of specimens was 0.357 in. diam. x 1.40 in. long. (Specimen R2 per Fed. Test Method Std. 151).

How Design Affects Quality Of Powdered Metal Parts

There's nothing mysterious about powder metallurgy. For many industries, it's becoming an important manufacturing tool.

But first, a practical understanding of its advantages and limitations is needed.

▪ Powder metallurgy is opening new horizons for metalworking. Its basic advantage stems from one simple fact—that the fabricator starts with a single metal particle and controls everything that happens to it while turning out a finished product.

Result: Power metallurgy parts are replacing many parts previously made by stamping, forging, casting and machining.

Lack Design Data — However, some industries are somewhat reluctant to use powder metallurgy, says P. J. Failla, general superintendent, machine shops, Johnson Bronze Co., New Castle, Pa. Perhaps it's due to the "lack of authoritative standards and design data."

With these facts in mind, some basic information and tricks of the trade on designing with powder to improve quality and reduce costs were recently presented by Mr. Failla. The occasion: The last ASME meeting in Detroit.

Working with powder offers a number of advantages. One: Special mechanical properties such as controlled porosity, weight and density. The making of special alloys is another. Complex precision shapes impossible or impractical to obtain by other methods is a third. Cost savings due to less machining and other manufacturing costs is a fourth.

How It Works — Basically, the process consists of pressing metal powders of high purity and control particle size to a given shape in a precise die.

Ejection from the die is followed by sintering, and other operations such as machining and heat treating.

Using the latest powder metallurgy techniques, it's possible to get mechanical properties comparable to those of wrought materials, says Mr. Failla.

Must Know Fundamentals— However, there are some basic fundamentals of the process that the design engineer must first understand.

Consider, for example, the friction of powders on die walls and punches. If parts are compressed from the top only, they will be less dense at the bottom. But parts compressed from top and bottom are less dense in the middle.

Thus, the greater the length to diameter and/or length to wall thickness, the more difficult it becomes to maintain uniform density.

Then, there are the mechanical limitations to tooling to bear in mind. Also, the fact that metal powders will not flow from regions

Tolerances Are Key Factors

COMMERCIAL DIMENSIONAL TOLERANCES, PLAIN CYLINDRICAL BEARINGS

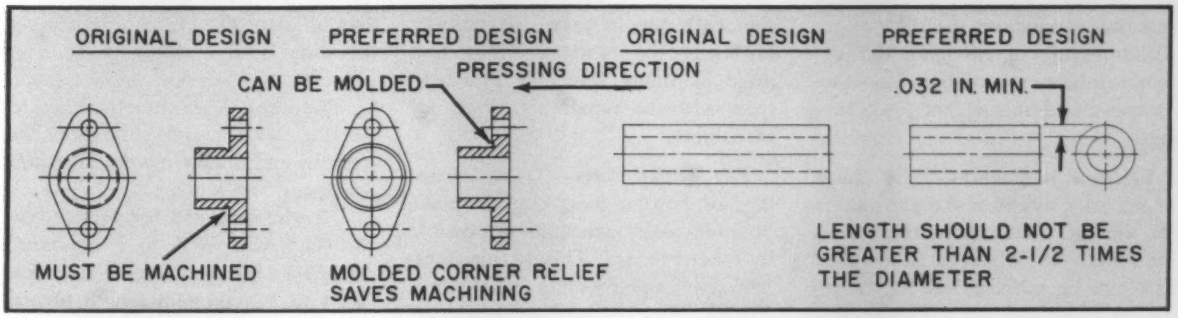
Inside and Outside Diameter, in.	Total Diameter Tolerance, in.[a]			
	Bronze Base		Iron Base	
	Inside Diameter	Outside Diameter	Inside Diameter	Outside Diameter
Up to 0.760	0.001	0.001	0.001	0.001
0.761 to 1.010	0.001	0.001	0.0015	0.0015
1.011 to 1.510	0.001	0.001	0.0015	0.0015
1.511 to 2.010	0.0015	0.0015	0.002	0.002
2.011 to 2.510	0.0015	0.0015	0.002	0.002
2.511 to 3.010	0.002	0.002	0.003	0.003
3.011 to 4.010	0.003	0.003	0.004	0.004
4.011 to 5.010	0.004	0.004	0.005	0.005
5.011 to 6.010	0.005	0.005	0.006	0.006

Length, in.	Total Length Tolerance, in.[b]	
	Bronze Base	Iron Base
Under 1.495	0.010	0.010
1.496 to 1.990	0.015	0.015
1.991 to 2.540	0.015	0.020
2.541 to 2.990	0.015	0.020
2.991 to 3.985	0.020	0.030
3.986 to 4.985	0.020	0.030

Outside Diameter, in.	Wall Thickness max., in.	Concentricity Tolerance, in.[c]	
		Bronze Base	Iron Base
Up to 1.010	Up to 0.255	0.003	0.003
1.011 to 1.510	Up to 0.355	0.003	0.003
1.511 to 2.010	Up to 0.505	0.004	0.004
2.011 to 3.010	Up to 0.760	0.005	0.005
3.011 to 4.010	Up to 1.010	0.005	0.005
4.011 to 5.010	Up to 1.510	0.006	0.006
5.011 to 6.010	Up to 2.010	0.007	0.007

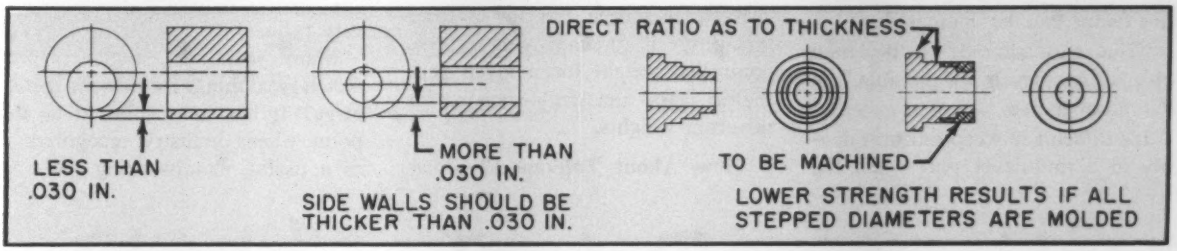
[a] Total tolerance on the inside diameter and outside diameter is a minus tolerance only.
[b] Total tolerance is split into plus and minus. [c] Total indicator reading.

Six "Golden Rules" of Powder Metallurgy



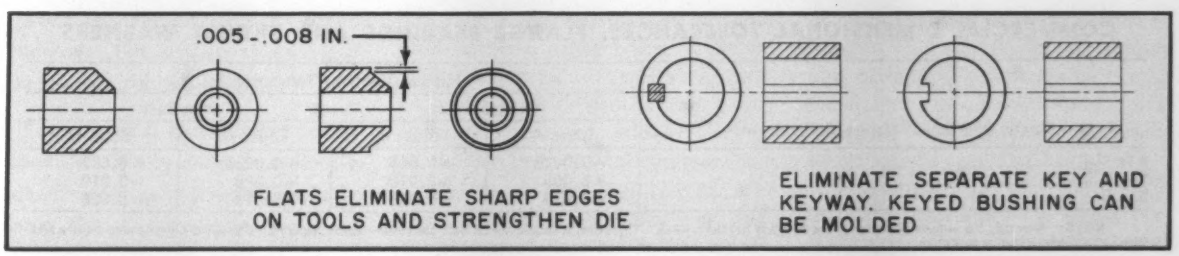
NO MACHINING: Shape of part should be such that it needs no machining after ejection.

THIN WALLS: Die friction limits the length to which a thin-walled part can be pressed.


DIRECT RATIO AS TO THICKNESS
LESS THAN .030 IN.
MORE THAN .030 IN.
SIDE WALLS SHOULD BE THICKER THAN .030 IN.
TO BE MACHINED
LOWER STRENGTH RESULTS IF ALL STEPPED DIAMETERS ARE MOLDED

SHARP CORNERS: Powder should not be required to flow into narrow splines or sharp corners.

UNIFORM DENSITY: The part should be designed with as few parts as possible.


.005 - .008 IN.
FLATS ELIMINATE SHARP EDGES ON TOOLS AND STRENGTHEN DIE
ELIMINATE SEPARATE KEY AND KEYWAY. KEYED BUSHING CAN BE MOLDED

STRONG DIES: Shape of part should permit the construction of strong dies and punches.

GEARS AND KEYS: Take advantage of powder metallurgy to make hard-to-fabricate parts.

of high pressure to lower pressure must be remembered when designing parts.

Six Golden Rules — These considerations and others lead to the six "golden rules" that should be kept in mind when designing a powder metallurgy part.

"The shape of the part must be such that it can be ejected from the die," is the first of Mr. P. J. Failla's "golden rules."

Many powder metallurgy parts can be directly molded into finished shapes. Others, however, need subsequent machining. These designs include such features as undercuts, side holes, re-entrant angles, reverse tapers and threads.

Many of these latter parts can be made economically by first making blanks by powder techniques, then machining the desired features.

Avoid Thin Walls—"The shape of the part should be such that the powder is not required to flow into narrow splines or sharp corners," is the second rule.

One rule of thumb is that side walls bordering a depression in a powder-metallurgy part should be thicker than 0.030 in.

Avoid feather edges. A rounded corner allows better and more uniform powder flow than does a sharp corner. And according to Mr. Failla, rounded corners result in increased strength in the finished part.

Dies and Punches—"The shape of the part should be such that it permits the construction of strong dies and punches," is the third rule.

Sharp edges should be avoided in both dies and punches. Try to avoid narrow, deep splines. Where possible, use round holes.

"Spherical bearings must have flats," is another of Mr. Failla's

recommendations. "Otherwise, they cannot be molded perfectly. Such flats eliminate sharp edges of tools and thus strengthen the die."

Simplifying or changing the design results in other benefits—tool economy and subsequent price savings.

Friction is Factor—"The shape of the part should make allowances for the fact that die friction limits the length to which a thin-walled part can be pressed," is the fourth golden rule.

Two and one-half times the cylinder diameter is the maximum length. If a thicker wall is used, this factor can be increased.

"The part should be designed with as few levels as possible," is rule number five.

It's difficult to keep uniform density in a multilevel part when the number of levels exceeds the number of pressing actions that the press can offer. However, if a design calls for an excessive number of levels, the fabricator may first mold as many levels as practical, then add the remaining levels by machining.

For Tricky Parts—"Take advantage of powder metallurgy to make possible many practices impossible by other means." This is rule number six. True involute gear forms, for example, which are hard and costly to make by other methods, can be made readily by powder techniques.

Another simple job for powder metallurgy is to make parts with a controlled weight for a given geometric shape and size—such as for governor weights.

How About Tolerances?—Inasmuch as tolerances affect the economy of the process, they should be as liberal as possible. One reason is the wear that takes place when pressing and ejecting parts from dies.

The tables are practical guides to the commercial tolerances for ferrous and nonferrous bearings and bushings.

They're intended for bronze-base bearings with a 4 to 1 maximum length to inside diameter ratio and a 24 to 1 maximum length to wall thickness ratio, and iron-base bearings with a 3 to 1 maximum length to inside diameter ratio and a 20 to 1 maximum length to wall thickness ratio.

Many years ago, engineers predicted great things for powder metallurgy. It has now matured to the point where industry recognizes it as a useful, metalworking tool.

How Much Leeway for Bearings and Washers?

COMMERCIAL DIMENSIONAL TOLERANCES, FLANGE BEARINGS AND THRUST WASHERS

Flange Bearings: flange diameter, in.	Flange Diameter Tolerance, in.			
	Bronze Base		Iron Base	
	Class A	Class B	Class A	Class B
0 to 1½	±0.0025	±0.005	±0.0025	±0.005
1½ to 3	±0.005	±0.010	±0.005	±0.010
3 to 6	±0.010	±0.025	±0.010	±0.025

NOTE: Normally the outside diameter of the flange is not too critical. Therefore, it should not be held too close—unless required. Class A tolerances may require additional operations, and thus cost more.

Flange Bearings: flange diameter, in.	Flange Thickness Tolerance, in.			
	Bronze Base		Iron Base	
	Class A	Class B	Class A	Class B
0 to 1½	±0.0025	±0.005	±0.0025	±0.005
1½ to 3	±0.007	±0.010	±0.007	±0.010
3 to 6	±0.010	±0.015	±0.010	±0.015

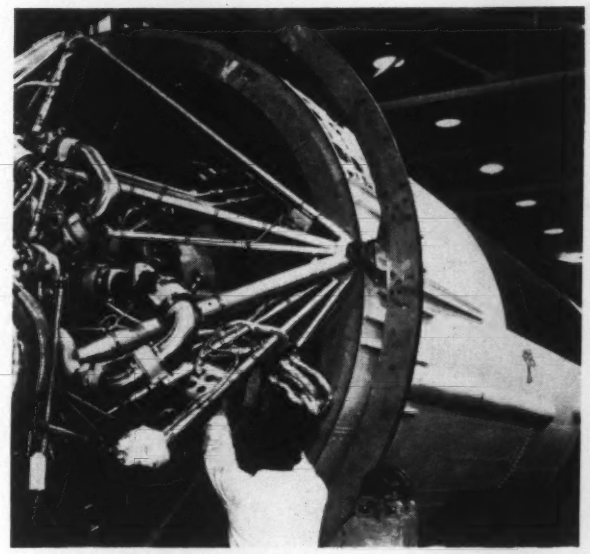
NOTE: Normally the thickness of the flange is not too critical. Therefore, it should not be held too close—unless required. Class A tolerances may require additional operations, and thus cost more.

Thrust Washers: thickness, in.	Thickness Tolerance, in. (for all diameters)			
	Bronze Base		Iron Base	
	Class A	Class B	Class A	Class B
0 to ¼	±0.0025	±0.005	±0.0025	±0.005

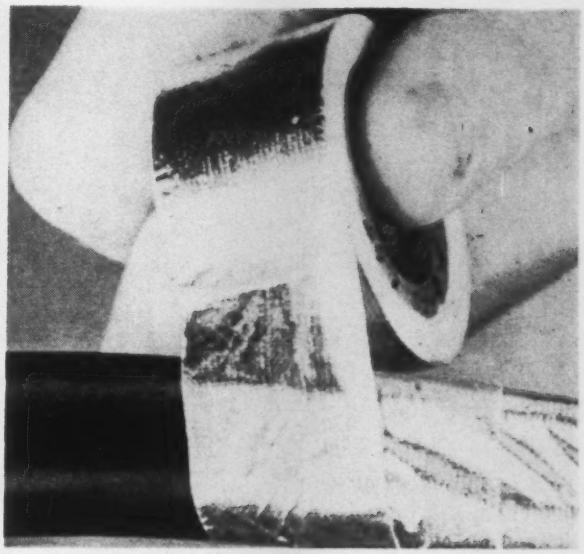
Flange Bearings and Thrust Washers: diameter, in.	Parallelism on Faces, max., in.			
	Bronze Base		Iron Base	
	Class A	Class B	Class A	Class B
0 to 1½	0.002	0.003	0.003	0.005
1½ to 3	0.003	0.004	0.005	0.007
3 to 6	0.004	0.005	0.007	0.010

NOTE: Closer tolerances can be held, but may require additional operations, and thus cost more.

NOTE: For flange bearings, the body tolerances—inside diameter, outside diameter, length and concentricity—are the same as for plain cylindrical bearings.



GUARDS AGAINST FAILURES: Delicate parts of the Titan missile depend on shielding-tape protection.



EASY TO USE: Glass-cloth, aluminum-foil tape quickly spirals around two electrical-control cables.

Shielding Tape Combats Heat

Searing temperatures often frustrate the progress of vital space-age technology.

They form a formidable roadblock. Ironically enough, a simple adhesive wrap is helping to tear down this design barrier.

■ When you talk to a missile project engineer, avoid mentioning heat. That may hit a sore spot. Crucial failures have been traced to heat damage. Delicate devices couldn't take it.

Designing heat resistance into the parts is one approach to the problem. This can be tough to do. It's also expensive. What's needed is a method to protect these units without adding unnecessary weight and cost.

A Better Way—Let's try another angle. Instead of built-in heat resistance, why not wrap it around the part? A newly-developed product makes this concept a reality.

Minnesota Mining & Mfg. Co., St. Paul, has come up with a pressure-sensitive tape that reflects punishing heat. It meets the demands of missile and aircraft manufacturers for an effective, easy method to protect vital components.

To form the highly-reflective tape, aluminum combines with adhesive-coated glass cloth. The wrap is a lamination of 0.0005-in. aluminum foil to 0.002-in. glass cloth. Like the glass cloth itself, the white-silicone adhesive is essentially inorganic. In the event of burning, it converts to silica.

As you might expect from the dimensions, the new tape is a feather-weight. It weighs only 0.0038 lb per ft for each inch of width. Nevertheless, it's tough. Each inch-wide strip takes a 75-lb pull.

Top Results — Company engineers boast the new tape shields parts against rocket-exhaust radiation from launch to burnout. This is a period of 1-2 minutes at temperatures well above 3000°F.

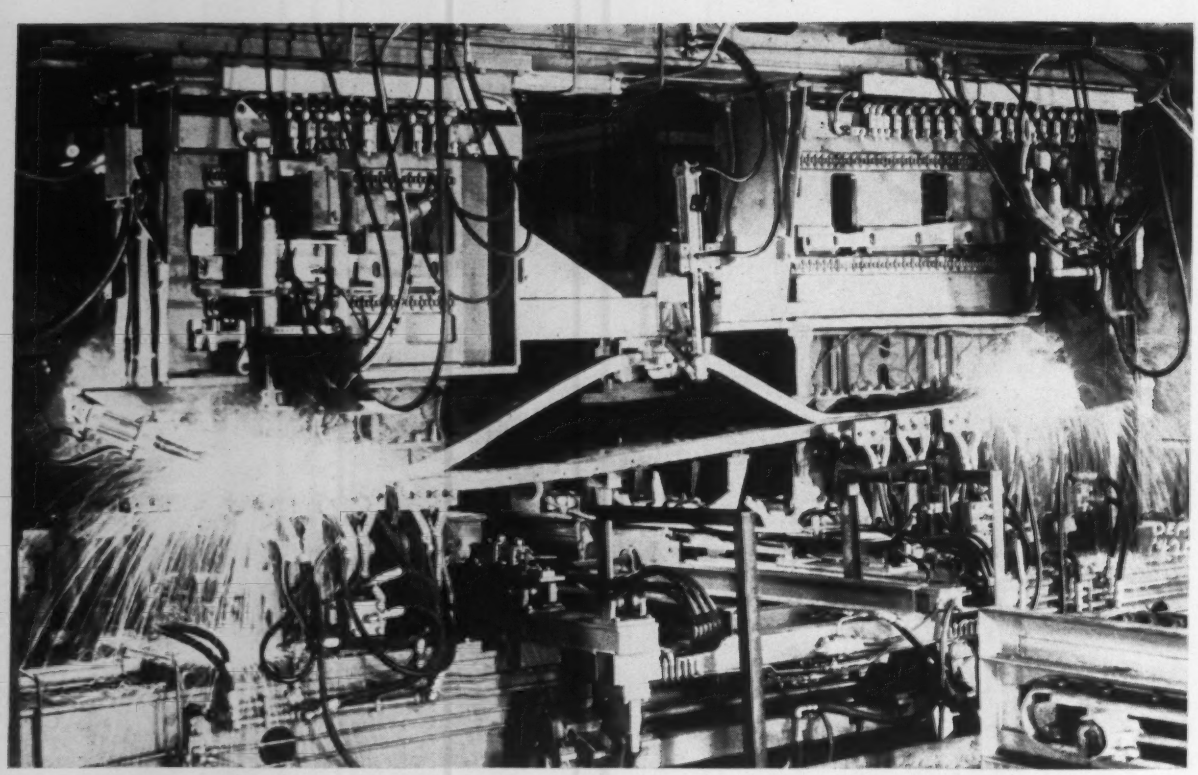
Also, the new material is easy to handle. Thin and flexible, it quickly and permanently adheres to irregular shapes and curved pipes. Spiral wrapping won't impair reflectance. Long aging is another bonus.

To some extent, the type of heat involved determines the tape's performance. For example, whether it's conductive, convective or radiated makes a difference.

In addition, the surface under the tape has some bearing on results. A heavy-metal plate helps conduct heat away from the shielding wrap.

How It's Used—The tape guards electrical-control cables, wire harnesses and circuits, piping and pump valves. It helps "beat the heat" on the Titan Missile and the Project Mercury Program.

Of course, the missile, aircraft and electrical fields are obvious applications; but let's not overlook other areas. Many uses for the wrap exist in the metalworking and construction industries. In fact, it's a natural wherever shielding sensitive parts is an essential condition.



PRIDE OF PLANT: Automotive Div. uses automatic "four-headed monster" to weld subassemblies.

CO_2 Welding Triggers Output

Thrives on Work Within Diversified Corporation

Economy, speed and quality are the main reasons that CO_2 welding enjoys such a foothold in so many applications.

At A. O. Smith, they're adding new uses every day.

■ Take the plant tour through any of A. O. Smith Corp.'s many divisions and you'll see CO_2 welding in action right on the production line. At present, this process is engaged in more than 200 installations within the framework of the corporation.

In the Automotive Division, for example, the technique has been used to weld more than six million control arms for wheel-suspension systems in passenger cars. Other divisions put the process to work in a variety of jobs. Pressure vessels, motors, railroad cars and line pipe all benefit from CO_2 welding methods.

Full automation is evident in the Automotive Division where two huge "monsters" are in operation. Each one of these units has four welding heads. All of them are used to weld truck frame assemblies. Here welding speeds reach rates of 200 ipm. Normal output is 85 assemblies per hour.

Variety of Uses—Semiautomatic welding is often used, too. Seam welds on brake beams for railroad cars are done in this manner. The Atomic and Process Equipment Division uses the semiautomatic approach to deposit lap welds on the shells of unfired, glass-lined hot-water storage tanks.

Seam welds on stator laminations are performed automatically in the Electric Motor Division. Both approaches are used in seam and fillet welding of fabricating dies, jigs, fixtures and machine parts in the Tubular Products Division.

One of the newer CO_2 joining methods, A. O. Smith's Button Welding is also getting quite a workout. This system was developed originally to replace or augment resistance spotwelding and/or riveting.

Teamwork — Button Welding is

used in final assembly work, while the automatic CO_2 seam welding serves in the joining of subassemblies. It's common to see both methods in operation on the same assembly, but at different stages.

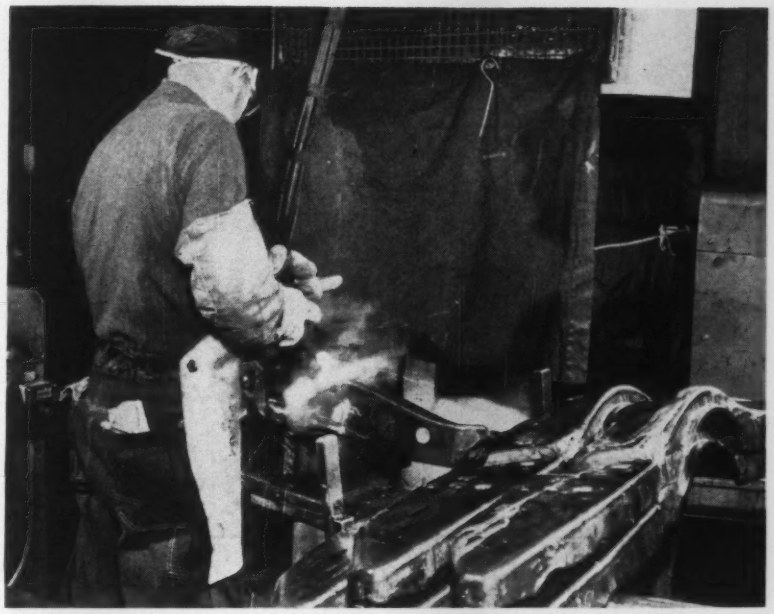
On trucks, component Button Welds join rear-axle trailing arms. In passenger cars, the process has many chores. Included are front control arms, spring retainers to side bars, and side-bar reinforcing strip and plate.

Another group within the A. O. Smith structure, the Welding Products Division, is a principal manufacturer of CO_2 welding equipment. Spokesmen for this group point out that big savings can be gained by switching from large diameter stick electrodes to semiautomatic CO_2 welding.

They note that the latter method will return its original investment in one to four months after depositing 1000-3500 lb of weld metal.

Four-Headed Monsters—At the Automotive Division where the huge "monster" machines are located, two heads on each machine weld the 24-in. seams at the truck frame's front inner rail to the side bar. The other heads weld the 48-in. seams at the rear inner rail to the side bar.

All of these welds are made simultaneously. The heads travel in unison toward the center of the bar.



BUTTON WELDING: The Button-Weld process is used to join spring retainers to side bars on assemblies for passenger cars.

It takes about 30 seconds for each assembly welding step.

The plant's frame assembly line is shaped like a "Y." Right side bars and inner rails come down one side while complementary structures come down the other side. Several piercing steps take place and certain flanges are hand welded before the parts reach the welding machines.

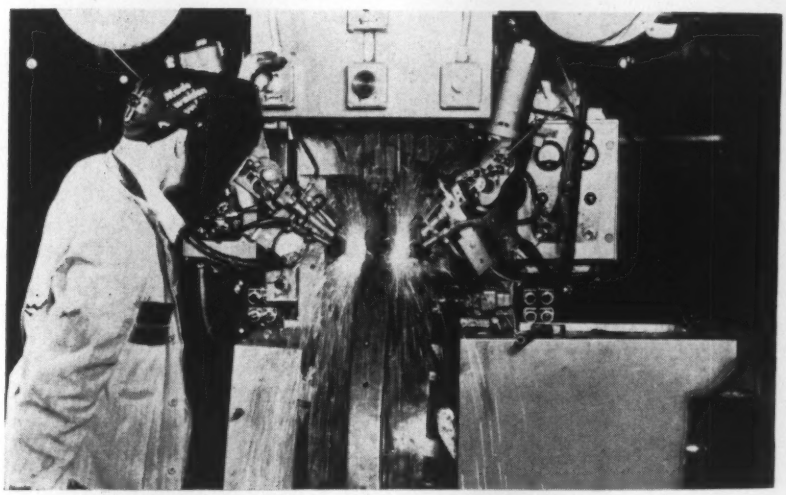
Double Duty—Side bars and inner rails are welded into subassemblies in the machines. Then the right and left sides of the frame come together and are welded into a single X-frame unit.

At each welding machine, two men load a side bar and clamp it. As soon as the front and inner rear rails are loaded, a button is pushed which depresses the rails into the side bar.

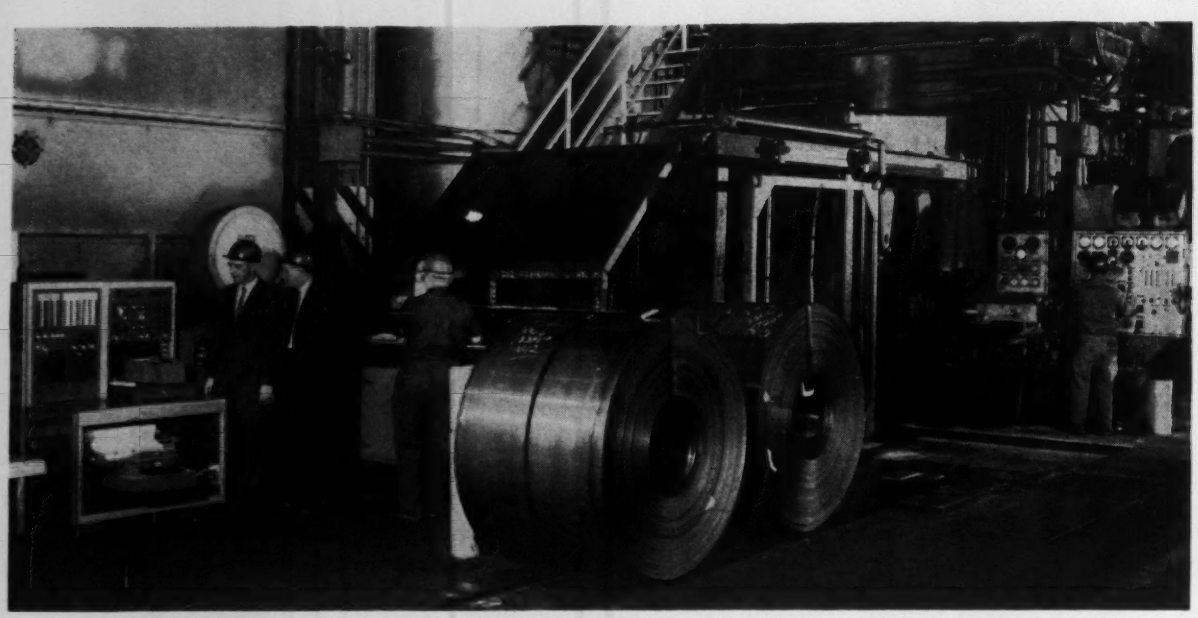
As soon as the "run" cycle starts, a walking-beam transfer device picks up the assembly and carries it about three feet to a dwell station. The assembly remains there until the welding station is free. Then the walking beam carries the assembly into the weld station.

Clamping Step—Here hydraulic cylinders clamp the part along the sides and the ends. The rails are depressed into the bar and end flanges are "squared up." Not until then do the welding heads go into action.

After welding, the X-frame moves down a conveyor line where various support members are added. Button Welding even gets in on the act. It's used to fasten a cover to the drive-line tunnel cover to the transmission.



STARTING POINT: The first automatic constant-potential CO_2 welding application used by A. O. Smith was on car-frame cross bars.



SEPARATES INFORMATION: The data logging system provides production, engineering, accounting, payroll and quality control with just the information that each department needs to function as a team.

Tape System Logs Mill Actions

Rolling mills take a firm view on record keeping. Facts on the mill's performance point the way to better products at less cost.

One company shelved pencils and clipboards for an automatic data-logging system which takes its cues right from the mill.

■ Keeping tabs on a normal day's output at a sheet rolling mill is costly and time consuming. However operations data are needed by many departments. Each one of these groups plays an important role in getting the finished product out the back door. To do this, they must be kept abreast of production.

Allegheny Ludlum Steel Corp.'s, Brackenridge Works, lets its four-strand cold mill write its own reports. The days' production story is automatically typed and placed on a punched tape as it happens.

All in a Day's Work—The automatic logging system records the steel's gage before and after rolling, customer order data, type of finish and melt number. Also, the unit pinpoints the time of day each coil is run, time required, operator, steel width and coil weight.

Delays are automatically logged, showing time elapsed and cause. "Reason for delay" is one of the most important items logged. The system contains a panel with which the operator can, by pushing appropriate buttons, record any one of more than 60 circumstances for stopping the mill.

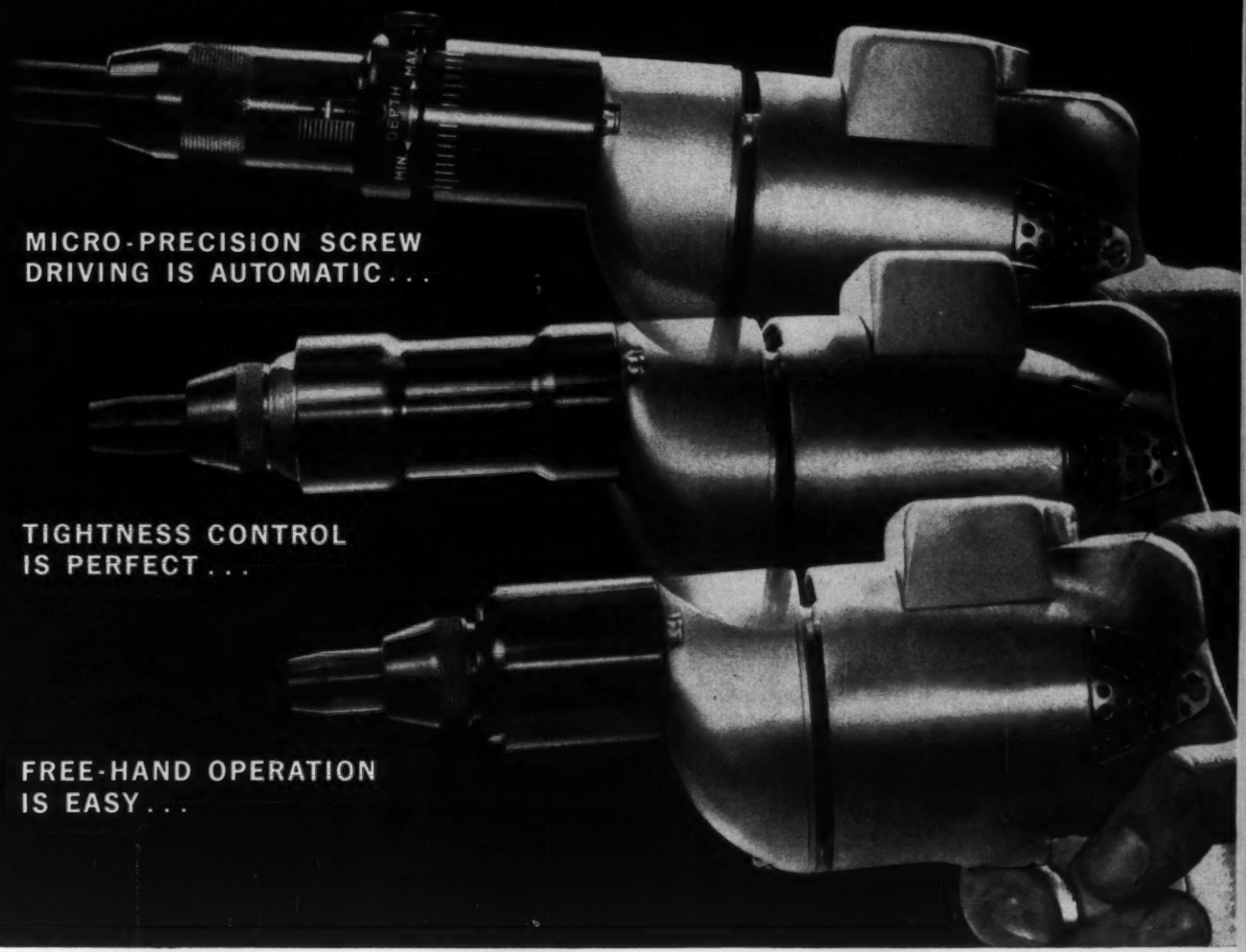
The system is so designed that once a halt in production is recorded, the mill cannot be restarted until the operator presses a "reason" button. This device presents management with a complete record of exact causes for production stoppages.

Why All The Fuss?—The logged data help decision makers plot product mix, average rolling times, payroll calculation with incentives, product yield, production costs and mill capacity. The sheets also show at a glance the major causes of downtime.

One company official said conversion to automatic data logging increases record-keeping accuracy. The unit also makes data more readily available for production reports and accounting purposes.

J. B. Murtland Jr., manager, Electromechanisms Dept., says, "The more information you can gather and review promptly, the more efficient and trouble free you can make the process of steel rolling to specified sizes."

One major advantage gained by the automatic system is the elimination of any manual transfer of information from one set of forms to another. The "break out," or separation of data, is done by transferring data from punched tape to automatic accounting cards. Once on the cards, any portion of the data can be reproduced automatically.



Cut man-hours to minutes... with Black & Decker's Screw Driver Line

If you want to drive screws to a depth set with thousandths-of-an-inch accuracy . . . do it automatically with the B&D Micro-Clutch Scrugun Screw Driver. If you want to drive screws to the right degree of tightness . . . do it perfectly with the B&D Adjustable-Clutch Scrugun® If you want to drive screws free-hand with your personal touch . . . do it easily with the B&D Positive-Clutch Scrugun.

Famous Black & Decker power makes any job with every Scrugun easier yet. Scruguns are reversible, too. Check out the complete B&D line of 17 different screw drivers. NOW . . . see how they are made to stay on the job longer, designed to take pride in your work, always. Buy them at leading distributors everywhere. *For sales or service, look in the Yellow Pages of the telephone book under . . .* TOOLS ELECTRIC

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The "cool" abrasive vital to ultrasonic machining . . .

NORBIDE* boron carbide

The Raytheon Company, a leading manufacturer of ultrasonic impact grinders defines the ultrasonic process as including:

. . . "*mechanical vibration at 25,000 cycles per second, above the range of the human ear . . . amplified and transmitted to the cutting tool . . . Tiny particles of abrasive are accelerated . . . and driven with tremendous impact against the work, thereby chipping or grinding an exact counterpart of the tool face into the work . . . This . . . together with the vibrating nature of the process, plus the absence of direct tool-to-work contact and the presence of the cool abrasive, make impact grinding a cool-cutting process. The work material is not stressed or distorted in any way, and is not raised in temperature.*"

Recommended by Raytheon, Norton NORBIDE boron carbide is the ideal cool-cutting abrasive for ultrasonic grinding and machining.

Always recognized as second only to diamonds in hardness, and as much more suitable for ultrasonic impact than silicon carbide grain, this Norton achievement has been recently improved to even higher effectiveness.

And now, improved NORBIDE boron carbide has greater freedom from impurities — which assures greater, longer lasting cutting power in each ounce of grain.

Raytheon Ultrasonic Impact Grinders are widely used for slicing of semiconductor wafers, as shown, and in later dicing of the wafers. Other machining operations include drilling, engraving, broaching, trepanning, shaping, shaving, lapping etc. Driven against the work with an impact force of 150,000 times its own weight, NORBIDE boron carbide grain is recommended by the Raytheon Company as the "cool" abrasive that meets every requirement for high precision, trouble-free cutting action.

Your Norton Man will be glad to tell you how ultrasonic machining is opening up new potentialities in many manufacturing fields, applied to a variety of materials — and how improved NORBIDE boron carbide can benefit your own operations in this modern field. See your Norton Distributor or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

G-415

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BORON CARBIDE

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NORTON PRODUCTS: Abrasives • Grinding Wheels • Machine Tools • Refractories • Non-Slip Floors — BEHR-MANNING DIVISION: Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

New Catalogues And Bulletins

Money-saving products and services are described in the literature briefed here. For your copy, just circle the number on the free postcard.

Arrest That Dust

Automatic bag-type dust arresters collect dust without interruption during bag cleaning. A new data sheet gives design and assembly information, tells how the dust collector operates, diagrams construction details, and tabulates dimensions and capacities. (Northern Blower Div., Buell Engineering Co., Inc.)

For free copy circle No. 1 on postcard

Abrasive-Belt Chart

Measuring 13 x 17 in., an application chart describes the correct abrasive belt and contact wheel for metalworking, woodworking, glass and plastics applications. General belt-sanding tips aid the belt-machine operator. (Armour Alliance Industries)

For free copy circle No. 2 on postcard

Giant Tool Catalog

The third edition of a comprehensive tool catalog presents a complete display of a wide range of tools. In 480 pages, the new literature presents a wealth of material, including 20 pages of useful reference tables. In addition, it's completely reset in larger type to spare the reader's eyes. (The L. S. Starrett Co.)

For free copy circle No. 3 on postcard

Engineered Shafts

Various production techniques are discussed in a new brochure that deals with precision shafts for industry. It briefly describes the special-alloy steels used in shaft and axle production. Also covered are testing and inspection methods, heat-treating and shot-peening processes, as well as other machining operations. (The U. S. Axle Co., Inc.)

For free copy circle No. 4 on postcard

Over 500 Twist Drills

By actual count, over 500 new twist drills have been added to a line of these items. All the data on the newcomers is set forth in a recently-revised drill catalog which covers the entire line. (American Twist Drill Co.)

For free copy circle No. 5 on postcard

Index to Translations

Diverse phases of Soviet metal technology are outlined in an index currently available. Included are over 300 titles from 10 Russian technical journals. Write on company letterhead to Mr. I. Flohr, Primary Sources, 11 Bleecker St., New York 12, N. Y.

Filters Coolants

New designs in filtration units are the subject of an 8 - page bulletin. The attractive 2 - color presentation highlights a line of modern machines designed to meet the highest clean - coolant standards. (Barnes Drill Co.)

For free copy circle No. 6 on postcard

Diffusion Furnaces

Solid-diffusion furnaces as an aid for basic research, pilot-plant studies and semiconductor production is the subject of a new 4-page bulletin. It illustrates and describes eight different units covering the needs of all three areas. (Lindberg Engineering Co.)

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Lock Washers

Conveniently sized to fit a pocket, this 2-color pamphlet tells how to select the right lock washer

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. **7/6/61**

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FREE LITERATURE

to meet job requirements. A wide variety of washer types and styles are included. (Shakeproof Div., Illinois Tool Works).
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Pressure Blasting

This special report covers pressure blasting with manufactured abrasives. Emphasis is on the proper selection and use of aluminum-oxide and silicon-carbide abrasives. (Advertising Dept., The Norton Co.)
For free copy circle No. 9 on postcard

Chemical Pumps

Useful information on a line of cradle-mounted chemical pumps is presented in a booklet which also includes a component - breakdown chart. Three pump models cover the range up to 1000 gpm with heads to 240 ft. (Ingersoll-Rand Co.)
For free copy circle No. 10 on postcard

Digital Voltmeter

Profusely illustrated, this 6-page folder shows individual plug - in modules as well as internal views of a new digital voltmeter. In addition to the usual information, specifications include items for use in data-system engineering. (Franklin Electronics, Inc.)
For free copy circle No. 11 on postcard

Flat-Top Roller Chain

Hot off the press, a colorful bulletin describes the properties of a new flat-top, conveyor - roller chain. Top plates on the new product are made of Delrin. Thus, excellent corrosion resistance is assured. (Acme Chain Corp.)
For free copy circle No. 12 on postcard

Hose Fitting

Developed to provide a low-cost, yet re-useable, fitting for high pressure hose assemblies, a new coupling suits industrial applications. All the details are set forth in well-executed brochure that includes useful specification charts. (Aeroquip Corp.)
For free copy circle No. 13 on postcard

Aluminum Tool Plate

This brochure lists the advantages of using any one of three grades of aluminum tooling plate. In addition, a reference table compares tolerances, properties and other pertinent data. (Aluminum Co. of America.)
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Put Tension on Drives

Three new drive tensioners, effective on all types of drives, are the subject of a 4-page data sheet. It lists dimensional data, selection tables and price information. (Maurey Mfg. Corp.)
For free copy circle No. 15 on postcard

New Concepts in Steel

Four papers discuss continuing advances in the strength levels, product forms and design applications of structural steel. They're printed in a 59-page brochure. Illustrations and descriptions show how these steels can be used in structures and equipment to achieve higher strength, lighter weight and lower costs. (U. S. Steel Corp.)
For free copy circle No. 16 on postcard

Lubrication Catalog

Featured in a 32-page catalog is a complete line of lubricating equipment. The literature describes fully - automatic, semi - automatic and manual methods of operation. (Lincoln Engineering Co.)
For free copy circle No. 17 on postcard

Vinyl, Rubber Review

New advancements in transfer molding, transfer splicing, and extruding products of Vinyl or rubber are the subject of a 16-page brochure. These products are of special interest to the automotive, appliance and construction industries. (Geauga Industries Co.)
For free copy circle No. 18 on postcard

Air Compressors

A 16-page catalog covers a complete line of air compressors for automotive, industrial and contractor applications. It includes data on more than 200 models, both gasoline and electric driven. (Lincoln Engineering Co.)
For free copy circle No. 19 on postcard

Heat-Treat Review

The review features an article which describes a line of car-bottom, heat-treating furnaces used to anneal axle housings. Other articles deal with heat-treat matters of general interest. (Surface Combustion Div., Midland-Ross Corp.)
For free copy circle No. 20 on postcard

NEW PATENTS

Forms Ore Pellets

Balling drum, W. B. Thomas, G. L. Cox, Jr., and L. G. Tucker, Jr. (assigned to Koppers Co., Inc.), May 23, 1961. An improved iron-ore balling drum of the Stirling type handles wet or sticky ore-feed materials. The balls or pellets that are formed produce sinter beds with high gas permeability suitable for high-speed sintering. U. S. 2,984,-860-1.

Iron Treatment

Coated - magnesium iron treatment, G. E. Spangler and J. W. Estes (assigned to Air Reduction Co., Inc.), Apr. 18, 1961. An additive agent for use in the production of nodular cast iron comprises 5-20 pct Mg chips, 2-10 pct CaO, and 70-93 pct CaC_2. Canadian 618,509.

Resists Creep

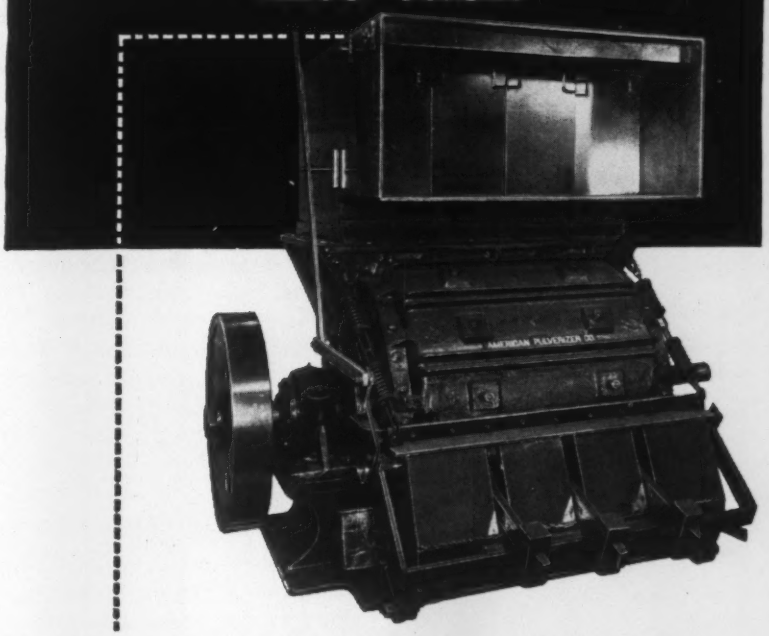
Creep - resistant, non - austenitic steels, G. T. Harris and H. C. Child (assigned to The Birmingham Small Arms Co. Ltd., Birmingham, England), May 23, 1961. A ferritic or martensitic steel has improved creep strength at temperatures on the order of 600-700°C. It consists of 0.08-0.2 pct C, 0.2 pct Ni, 10-13 pct Cr, 5-10 pct Co, 0-2 pct W and/or Mo, 1.5-2.5 pct Cb and/or Ta, 0-1.5 pct V, 0-0.02 pct B, 0.02-0.09 pct N, 0-0.1 pct Al, and the balance essentially all Fe. U. S. 2,985,529.

Adds to Ferroalloys

Ferroalloy additive agent, E. R. Saunders and R. L. Pope (assigned to Union Carbide Corp.), Apr. 18, 1961. A non-exothermic alloy incorporates alloying ingredients in low-alloy steels during tapping. It consists of 96-99 pct Fe-Mn in particle sizes up to ¼ inch coupled with a 1-4 pct organic binder. Canadian 618,525.

Copies of U. S. Patents are available at 25¢ each from Commissioner of Patents, Washington 25, D. C.

convert metal turnings into cash

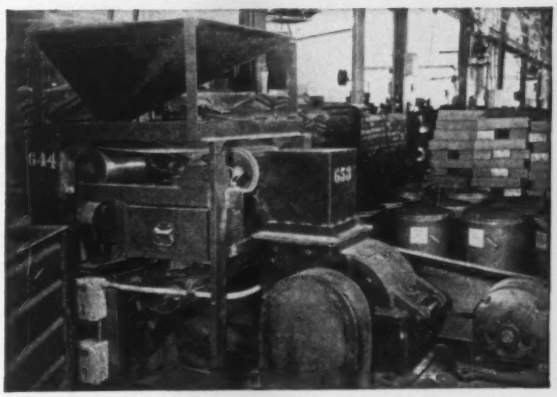


Long, curly, troublesome metal turnings, reduced in an American Metal Turnings Crusher, can produce additional profits for your plant.

Reduced to chip form, metal turnings bring $2 to $5 more per ton. Handling metal chips by shovel or pneumatic systems is easier, too, and chips require 75% less storage space than bulky machine turnings. You'll recover more cutting oil from chips . . . up to 50 gallons per ton! More important, American Metal Turnings Crushers pay for themselves and produce substantial profits for years to come. Models available with capacities ranging from 1 to 50 tons per hour. To get all the details, write American today.

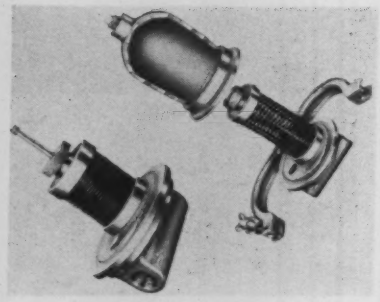
reclaim fused welding flux

One industrial plant saved more than $10,000 a year by using an American Welding Flux Crusher to regranulate fused welding flux. Write American for details.



American PULVERIZER COMPANY
ORIGINATORS AND MANUFACTURERS OF RING CRUSHERS AND PULVERIZERS
1439 MACKLIND AVE. SAINT LOUIS 10, MISSOURI

New Materials and Components



Compression-Spring Device Filters High Volumes

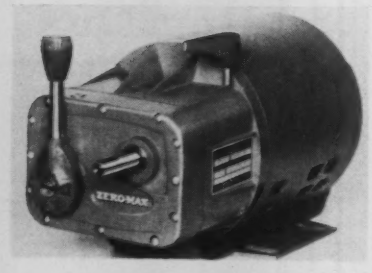
Two interwound springs, one wire coiled around the other, are the heart of an easy-to-clean filter. It handles high volumes of any fluid that can be pumped. Advantages of this unusual construction lie in precision spacing, and in spring-apart cleaning action with automatic return to the original-filter pattern. The unit comes in three models, for pressurized pipe lines, suction tubes and immersion pumps. Four elements yield filter action comparable to 20-, 40-, 60- and 100-mesh screens. For corrosive liquids, an all-stainless model does the trick. (Chrom-O-Lite Co.)

For more data circle No. 21 on postcard, p. 85

Tiny Timer Motor Boasts Lifetime Operation

Here's a new concept in synchronous timer-motor design. It hinges on a method of sealing all moving parts in mineral oil. This means noiseless and long-lasting continuous operation. Of course, complete sealing is a must. To get it, a packing gland confines the oil to the housing and keeps it there when the motor's running. Key element of the packing gland is a neoprene O-ring. Constant spring pressure forces against the O-ring. Thus, there's always a positive seal. Another bonus is the timer's small size. Its OD measures only 1-11/16 in. This conserves precious installation space. (Lake City, Inc., a subsidiary of Controls Co. of America)

For more data circle No. 22 on postcard, p. 85



Optional Reverse Upgrades Variable-Speed Drives

Units in a line of variable-speed drives are now available with a fast, positive, mechanical reverse. To avoid interference, the reverse-control knob operates independently from the speed-control lever. On the smaller drives, the reversing mechanism changes the drive direction of the overrunning clutches in the output section. On the larger units, a bell crank and gear arrangement reverses the output. In either case, there's a neutral position which disengages the output shaft. (The Zero-Max Co.)

For more data circle No. 23 on postcard, p. 85

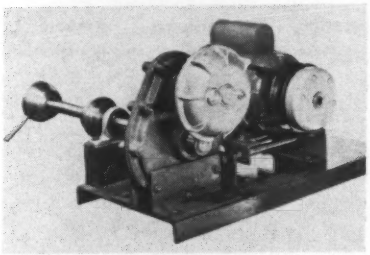
Purifiers Guard Against Exhaust-Fume Poisoning

Eliminating dangerous fumes from exhaust gases would remove the major drawback of LP-gas and non-leaded, gasoline-powered, materials-handling equipment. These trucks feature low-initial cost, easy maintenance, and ample power for steep ramps. But, there was always the danger of carbon monoxide and other contaminants in the exhaust fumes. Now, a purifying muffler gets rid of these objections. Basic unit of the purifier is a cartridge consisting of spaced-porcelain rods coated with a catalytic agent. As the engine exhaust flows across the surface of these rods, carbon monoxide and other noxious vapors oxidize. What remains is a harmless effluent, mostly carbon dioxide and water. (Oxy-Catalyst, Inc.)

For more data circle No. 24 on postcard, p. 85

Controls Tension

A new line of low-cost reel winders and winder drives provide controlled tension for just about any

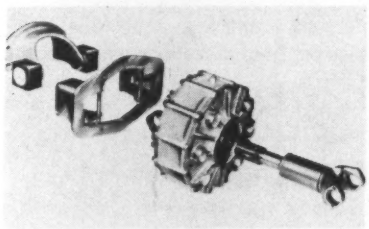


center-winding operation. Fluid drive automatically delivers increasing torque and tapered tension over core ratios as high as 8:1. Process speeds vary up to 3:1. Since two simple controls provide this wide range of tensions and speeds, you can use a single machine for many winding uses. Also, low-inertia driven members, coupled with hydraulic cushioning, hold shock and acceleration to a new low. (Fluid Drive Engineering Co.)

For more data circle No. 25 on postcard, p. 85

Driveline Retarder

Here's a new unit that combines a retarder, a propellor shaft and an unusual mounting bracket into a package assembly. The hydro-dy-

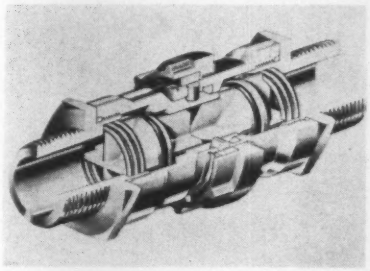


namic braking unit uses the field-proven Thompson retarder as an integral part of the vehicle driveline. You don't need to use multiple universal joints or additional mounting brackets. It's a new installation concept that requires fewer parts, reduces weight and saves time. The 2-piece mounting bracket features rubber-mounted journals. This ensures that propeller-shaft joint angles are not disturbed during transmittal of power from transmission to axle. In addition to supporting the retarder, the mounting bracket also transfers retarder brake-action torque through the transmission and engine case to the vehicle frame. (Dana Corp.)

For more data circle No. 26 on postcard, p. 85

Quick Connecting

This standard line of industrial-type, quick-connect couplings are directed to heavy-duty applications. The star-shaped units provide free flow which reduces pressure drop across the line. In disconnect position, positive-sealing action results from the use of heavy stainless-steel springs, and O-rings recessed in the

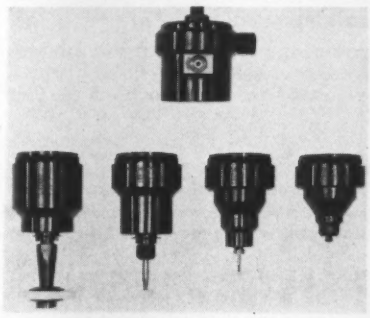


rings. Also the mechanical advantage of the mating surfaces pulls the nipple tightly into the socket. This means there's always a positive seal and lock. High reliability over a broad temperature range is another bonus. (The Siegler Corp.)

For more data circle No. 27 on postcard, p. 85

High-Speed Holes

While correct-cutting speeds for diamond and carbide points are not as high as with abrasive wheels, the correct sfpm for small diameter holes is still beyond normal speeds. However, new grinding units are designed to remedy this situation. When they're on the job, precision



grinding at 300,000 rpm is a reality. Actually, speed ranges from 215,-000-300,000 rpm for holes that are

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but cost of possession never sleeps

The most dormant looking thing in the world is a pile of steel in storage . . . yet it is as active as a bucket of worms!

Your money is tied up . . . and costs go merrily on. High local taxes. Scrap losses from inefficient utilization of obsolete sizes or gauges of steel in inventory. Capital pinned-down by steel inventory could better be at work as income-earning investment.

Here's an ideal solution for most steel users . . .

Use the complete stocks of your nearby steel service center just as if they were your very own. Convenience and availability are augmented by other economies. Plus, of course, the variety of first-step processing services which many centers are tooled-up to provide.

To help your production and cost accounting people in figuring the true cost of steel stocks, ask your steel service center salesman for the booklet, *What's Your Real Cost of Possession for Steel?* Or write to Steel Service Center Institute.

COST OF POSSESSION . . . *to determine your own cost of possession for steel in inventory, consider all these factors:*

Cost of capital: inventory, space, equipment — Cost of operation: space, material handling, cutting and burning, scrap and wastage — Other costs: obsolescence, insurance, taxes, accounting.

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Convenient to every steel user, steel service centers are customer-oriented, technically competent, fully equipped for fast delivery of steel in any type, form, and quantity.

STEEL SERVICE CENTER INSTITUTE

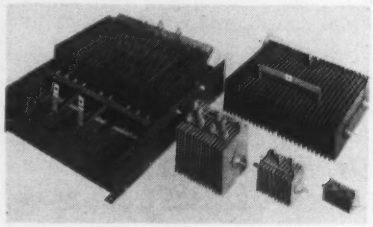
DESIGN DIGEST

0.020-0.090 in. in diameter. Adapters are available to easily convert any machine tool to a high-speed grinder. (The Vulcan Tool Co.)

For more data circle No. 28 on postcard, p. 85

Selenium Rectifier

High current-density selenium rectifiers suit electroplating and anodizing, battery charging, welding and dynamic braking applications. These new cells come in current ratings from 200 milliamps, half-wave convection cooled, to 33 amp, half-wave forced-air cooled. Any number of cells can be placed in parallel for higher ratings. As an example, rectifier stacks for plating are available up to 5000 amp. In addition, the newcomers are rated at 33-v ac. Thus, any number can be put in



series to get higher-voltage ratings. Since the new design eliminates the artificial-barrier layer, you can expect minimum aging and long, trouble-free life. (Westinghouse Electric Corp.)

For more data circle No. 29 on postcard, p. 85

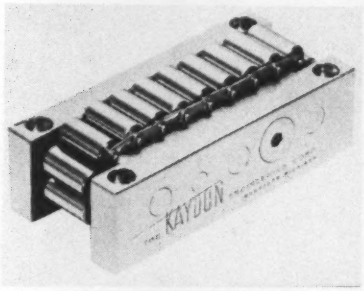
Tiny-Thread Inserts

Screw-thread inserts that provide permanent threads in soft metals are now available in new miniature sizes. Using wire screw-thread inserts instead of solid bushings saves boss space, weight and material. These savings result from the light weight of the wire insert, its small OD, and minimum boss requirements. A new line of stainless-steel, wire-thread bushings offers these savings along with the corrosion resistance of stainless. Suitable tools for installing the inserts are also available. These include taps, inserting tools and inspection gages. (Heli-Coil Co.)

For more data circle No. 30 on postcard, p. 85

Death Blow to Friction

Boasting a coefficient of friction as low as 0.00025 under a 500-lb load at 0.25-ipm linear motion, a new recirculating roller bearing deals friction a death blow. Key to the newcomer's performance is a

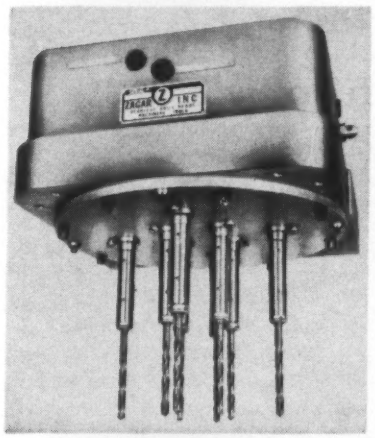


recirculating cage with positive-roller guidance between lipped raceways. Ultra-precision components with extremely-low rms surface finishes help too. An approach ramp in the roller path lets the rollers feed freely into the load zone for smooth operation. At the present time the bearings are made to order; but plans are being made to carry them as stock in the future. (The Kaydon Engineering Corp.)

For more data circle No. 31 on postcard, p. 85

Drilling Spindles

Slip- or cartridge-type spindles are now offered on a line of multiple-spindle gearless heads for drilling, reaming or tapping. A pre-



bored plate accepts the spindles in varying patterns. Therefore, it's a simple matter to insert and remove spindles while retaining the rigidity and accuracy of fixed-center drilling. Also, the absence of gears and

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Services which are available from steel service centers in your area include: burning, precision shearing, slitting, flame-cutting, sawing, leveling and edging.

Pre-delivery processing is backed by expert steel experience to help you operate economically, yet produce to high standards. Your "cost of possession" of steel is reduced, too. Call on your local steel service center for recommendations, service and delivery.

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STEEL SERVICE CENTER INSTITUTE

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"They're studying the new machine tool."

"I know. But why the President and 3 Vice Presidents...of Production, Engineering, and Purchasing?"

"All of them got into buying it."

"But each has a different point of view?"

"Sure. But each can appreciate the others', because each keeps up to date in the same way."

"How's that?"

"They all read the IRON AGE."

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joints reduces overall height of the head. This feature becomes important where space is limited. Spindle sizes are 1¼ and 1½ in., with capacity up to 9/16 in. in steel. (Zagar Inc.)

For more data circle No. 32 on postcard, p. 85

Flexible Gear Coupling

Composed of five simple units, a new, flexible, gear coupling weighs only 14 oz. Overall length is 2⅜ in. Despite its small size, the newcomer operates at speeds up to 500 rpm. It absorbs misalignment as great as ±3°. Because of the nylon sleeve and special crown-hobbed hub teeth, the coupling needs no lubrication. In addition, it runs in either standard or vertical positions. The units come in ⅜-in. rough bore

and eight finish-bore sizes ranging from 0.500-1.125 in. (Sier-Bath Gear & Pump Co., Inc., Flexible Coupling Div.)

For more data circle No. 33 on postcard, p. 85

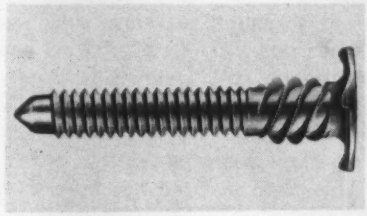
Solenoid Valves

A new basic design in sub-miniature solenoid valves has just been announced. The newcomers are for use in hydraulic and pneumatic devices and control systems. They operate with all common media, including many semi-corrosive fluids. Body and operating parts are stainless steel. Orifices are 3/64 in., and fluid connections are all 1/16 in. Because of this small size, each valve has fittings to adapt it to standard ⅛-in. flared tube. (Skinner Electric Valve Div.)

For more data circle No. 34 on postcard, p. 85

Mounting Screws

Available in two standard head designs, wafer and flat head, a new line of mounting screws eliminates the need for countersinking to get

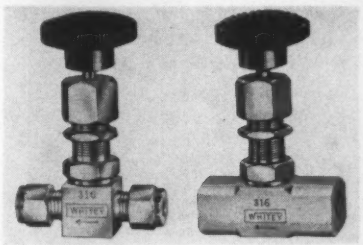


flush mountings. The newcomers have multiple-thread, left-hand retaining sections and torque-increasing "nibs" under the head to prevent stripping in the panel. These features also eliminate the need for retaining nuts. A further feature of the line is a nut-locating and orientating point. This point consists of a lead-in cone and a smooth cylindrical section to bring the nut into mating position with the thread. (Shakeproof Div., Illinois Tool Works)

For more data circle No. 35 on postcard, p. 85

Bar-Stock Valves

For ⅛- and ¼-in. tube or pipe connections, a new line of screwed-bonnet, bar-stock valves come in type-316 stainless steel and Monel. The compact units are recommended for instrumentation use, or any place where leak-tight, on-and-

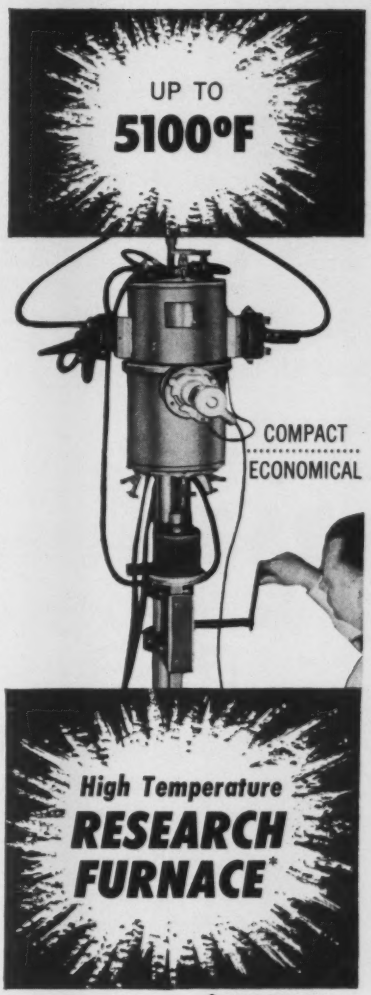


off control is essential. Panel mounting, Teflon cylinder packing, micro-regulating and non-regulating stems are all standard features. (Whitey Research Tool Co.)

For more data circle No. 36 on postcard, p. 85

Elapsed-Time Indicator

This unique timing device can be included in new machines or added to existing office or produc-



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Extremely Compact —
8" high x 4" diameter working volume contained within a 20" x 10⅛" unit. Also available, 15" high x 12" diameter working volume contained within a 30½" x 22" unit.

Controlled Atmosphere — Inert gas protects charge and furnace element.

Water-Cooled — Circulation through electrodes, coverplates and outer shell.

Easy Furnace Access —
Removable top and bottom covers, with hearth lift mechanism for bottom loading.

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Inert gas is directed against side and top sight ports to scavenge atmosphere.

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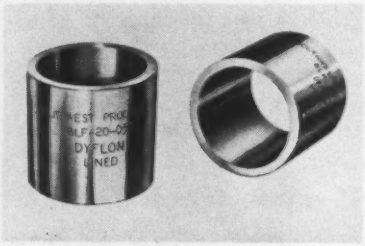
tion machinery. It's a cumulative timing device that records the exact time the machine has operated. Thus, it provides accurate data for part servicing and replacement. Another use would be the substantiation of operating time for manufacturer's guarantees. Its usefulness in rental operations is obvious. Of course, the timing unit is tamperproof. It operates only when electrical equipment is energized. (Automatic Timing & Controls, Inc.)

For more data circle No. 37 on postcard, p. 85

Journal Bushings

New journal bushings take dynamic loads up to 25,000 psi and withstand static-yield loads of 50,000 psi, at low rotational speeds. Stainless-steel bushings house plastic-alloy inserts made of Dyflon. This same material has been used in spherical bearings for over three years. As a result, the journal bushings will last almost indefinitely at a unit loading of 10,000 psi with moderate surface speeds. Even at



highest-dynamic loading no galling, fretting nor brinneling will occur. However velocities in excess of 150 fpm should be avoided. Bore sizes range from ¼-3 in. (Southwest Products Co.)

For more data circle No. 38 on postcard, p. 85

Speeds Cloth Changes

Here's a boon to vibrating screen operators. It's a new device that makes it possible to change screen decks in a fraction of the time formerly required. It also lets you tension the cloth while the screen is in operation. The fastener provides a 1¼-in. adjustment on each side of the deck, or 2½ in. overall. Thus, one size fits all sizes and types of vibrating screens. Greater flexibility

in the operation and upkeep of wire-cloth and plate decks results from its use. (Allis-Chalmers Mfg. Co.)

For more data circle No. 39 on postcard, p. 85

Fluid Power Valves

New hydraulic-pilot (directional) valves suit pressures up to 3000 psi. They feature direct-solenoid operation with spring - returned plungers. The solenoid is totally

RA 330® brings the space age **CLOSER**

RA 330 supports rocket cases in pit furnace 10 ft. diameter by 30 ft. deep.

RA 330 provides strength at 1900° F. to support, without fear of dropping, a 3500 pound load; resistance to thermal shock of rapid heating and air quenching; resistance to furnace atmosphere and oxidation.

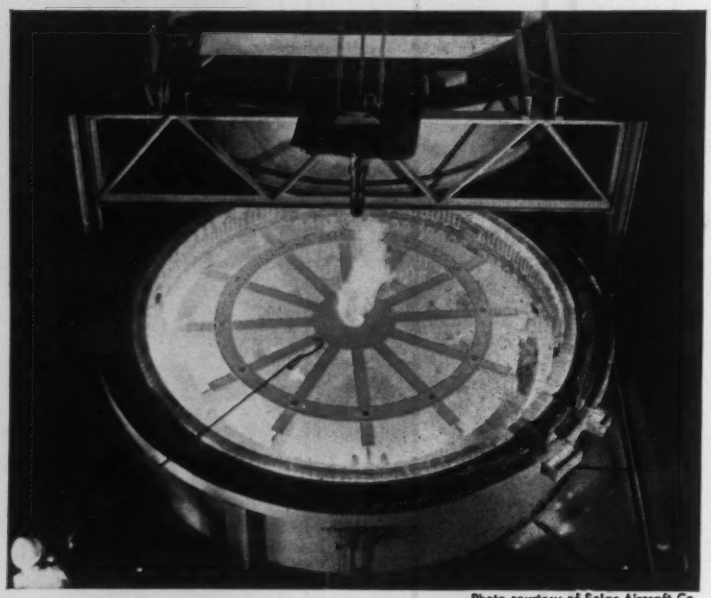


Photo courtesy of Solar Aircraft Co.

Based upon highly successful use of RA 330 in other applications with temperatures ranging up to 2250° F., Solar Aircraft Company selected RA 330 for this critical application.

For best performance specify RA 330 for your heat treating fixtures and furnace parts.

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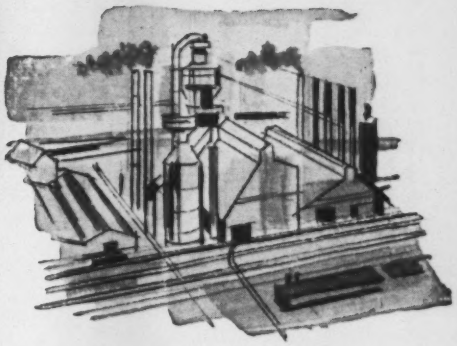

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in Jeffrey chains

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You can select Jeffrey chain and attachments for every steel mill requirement or have them tailor-made to fit the job. The Jeffrey Manufacturing Company, 925 North Fourth St., Columbus 16, Ohio.

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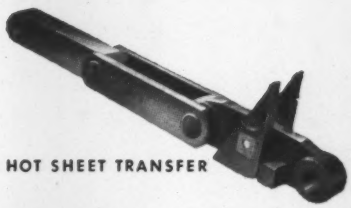
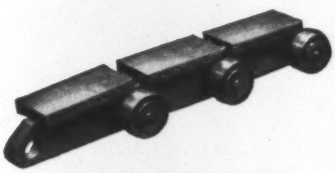
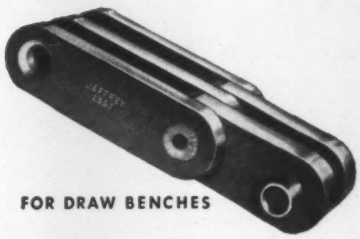


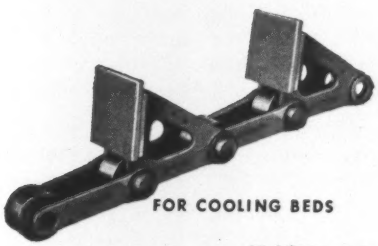
FOR HOT SHEET TRANSFER



FOR HOT COIL CONVEYORS



FOR DRAW BENCHES



FOR COOLING BEDS

FOR PALLET CONVEYORS

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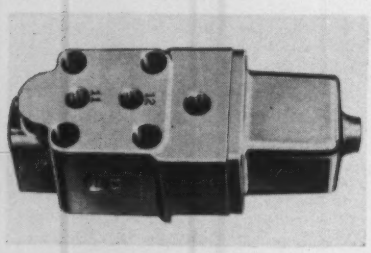
DESIGN DIGEST

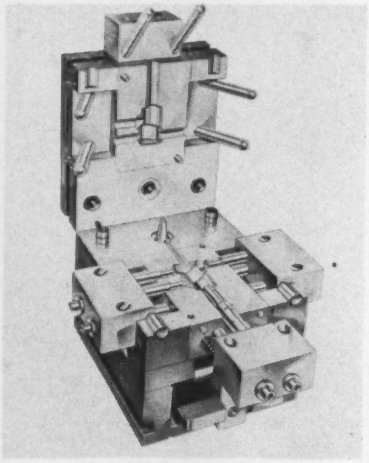
enclosed and sealed against moisture and contaminated atmospheres. However, a stem in the solenoid cover lets you operate the valve manually. Thus, setup and trouble shooting is no problem. Other features include large flow areas, alloy-iron bodies, accurately-machined port openings and alloy-steel plungers. (The Oilgear Co.)



For more data circle No. 40 on postcard, p. 85

Unit-Die Molds

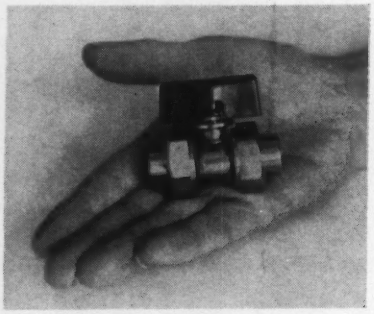
Here's a new single-station unit die that's especially suited for automatic cycling since it incorporates side-core pulls. Removable sections let the diecaster put in removable side-core pulls for each or any of three sides (right, left and front). There's also an added automatic kicker pin for positive ejection of molded products. Designed for vertical position and for shooting in the lower position, the product especially suits aluminum die casting. (Richards Tool & Mold Co.)



For more data circle No. 41 on postcard, p. 85

Miniature Ball Valves

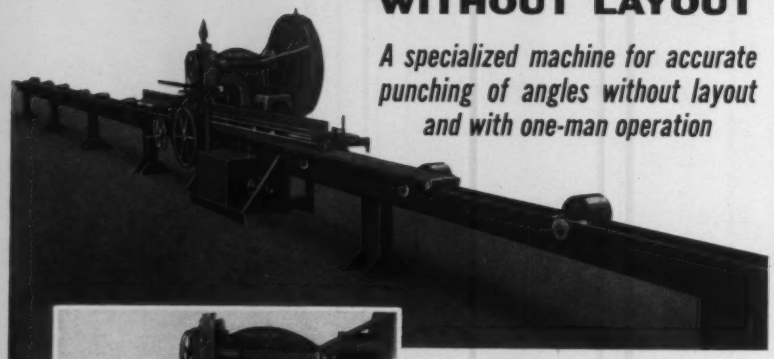
The unique advantages of ball valves are now available for use in sampling, instrumentation, metering and similar applications. A new line of tiny ball valves offers attractive appearance, compactness, easy operation and high-flow efficiency. The valves are ideal where flow control is critical because very little effort is needed to rotate the valve handle. They come in ⅛-, ¼-, ⅜- and ½-in. sizes. Teflon seats and packings are standard. Maximum pressure rating is 1000 psi. (Valve & Fitting Div., Cooper Alloy Corp.)

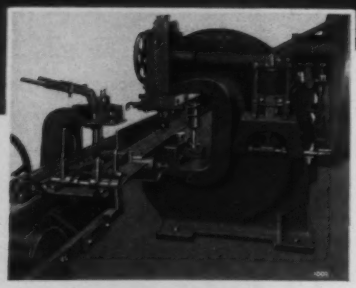


For more data circle No. 42 on postcard, p. 85

One-Man Angle Punching
WITHOUT LAYOUT

A specialized machine for accurate punching of angles without layout and with one-man operation





Single or multiple tooling, of fixed or sliding type, may be provided. Multiple tools permit the instantaneous selection of different diameter punches. Sliding tools provide for straight gauge line and odd hole punching without delays.

Controls for spacing, punching and unloading are centralized for one-man operation.

Write for Bulletin 313A

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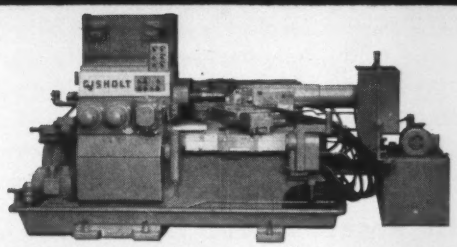

MASTERLINE® NO. 12 Automatic Chucking Lathe—horizontal model shown . . . vertical model is also offered, in addition to a larger, No. 24 Lathe.

As practical for small lots as large production runs.

All three feature rugged construction, ease of control and fast setup. Single- or multiple-pass JETracing (shown) can be part of the automatic cycle for lower tool costs, even faster setup, minimum inspection and increased versatility of the basic machine.

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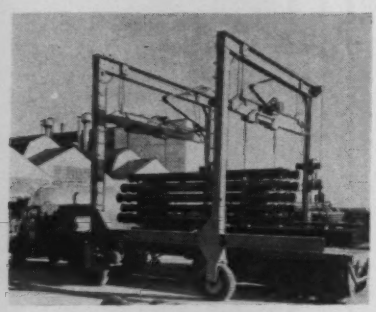
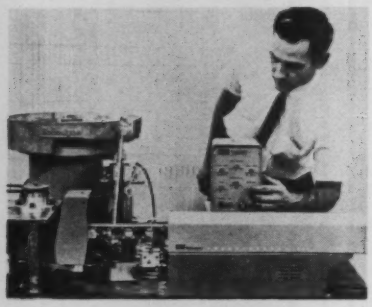


Mobile Overhead Crane Straddles the Work

Combining brute strength with versatility, mobile lifts transfer highway trailers and containers up to 80,000 lb in three minutes. But piggyback freight handling is only one area of use. Standard models offer a wide selection of types, sizes and capacities. Under one-man control, the units pick up, traverse and angle a load, all in a single application. Wheel base and lifting points are adjustable. Also, all standard models can be adapted for special tasks. The manufacturer offers an engineering service to modify models within design limitations. (Drott Mfg. Co.)

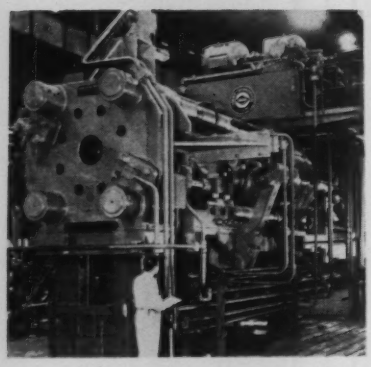
For more data circle No. 43 on postcard, p. 85



"Brainy" Industrial Robot Bosses Other Machines

This low-cost industrial robot works on any assembly line under the command of its own electronic "brain." The machine consists of arm and an actuator, which can be fitted with many types of fingers and jaws. It uses these devices to seize, move, position and relinquish a workpiece. Acting under the stimulus of its program, the robot performs its own tasks and orders other machines to act as well. On a typical job, it feeds rough parts to a trimming press, orders the press to cut off excess material, and checks parts discharge from the press. (U. S. Industries, Inc.)

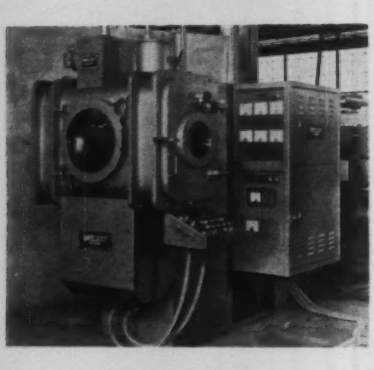
For more data circle No. 44 on postcard, p. 85



Massive Press Extrudes Aluminum-Tube Products

Rated at 3000 tons, an oil-hydraulic extruder turns out 5000-6000 lb of aluminum tubing every hour. Tube diameters vary up to 6 in. Or, the press produces as many as six smaller tubes simultaneously through multiple-die holes. Press specs tell the story. Dead-cycle time is only 21 seconds. But main-ram stroke is 66 in. Capacity is also worthy of mention. In shear it's 100 tons; for continuous stripping, 285 tons. Continuous-sealing capacity is 228 tons. Also, the press takes a die stack 18 in. in diameter x 18-in. deep. Many features account for this performance. One of them is a double-die slide system. It lets you prepare a set of dies while the press is in operation. (Baldwin-Lima-Hamilton Corp.)

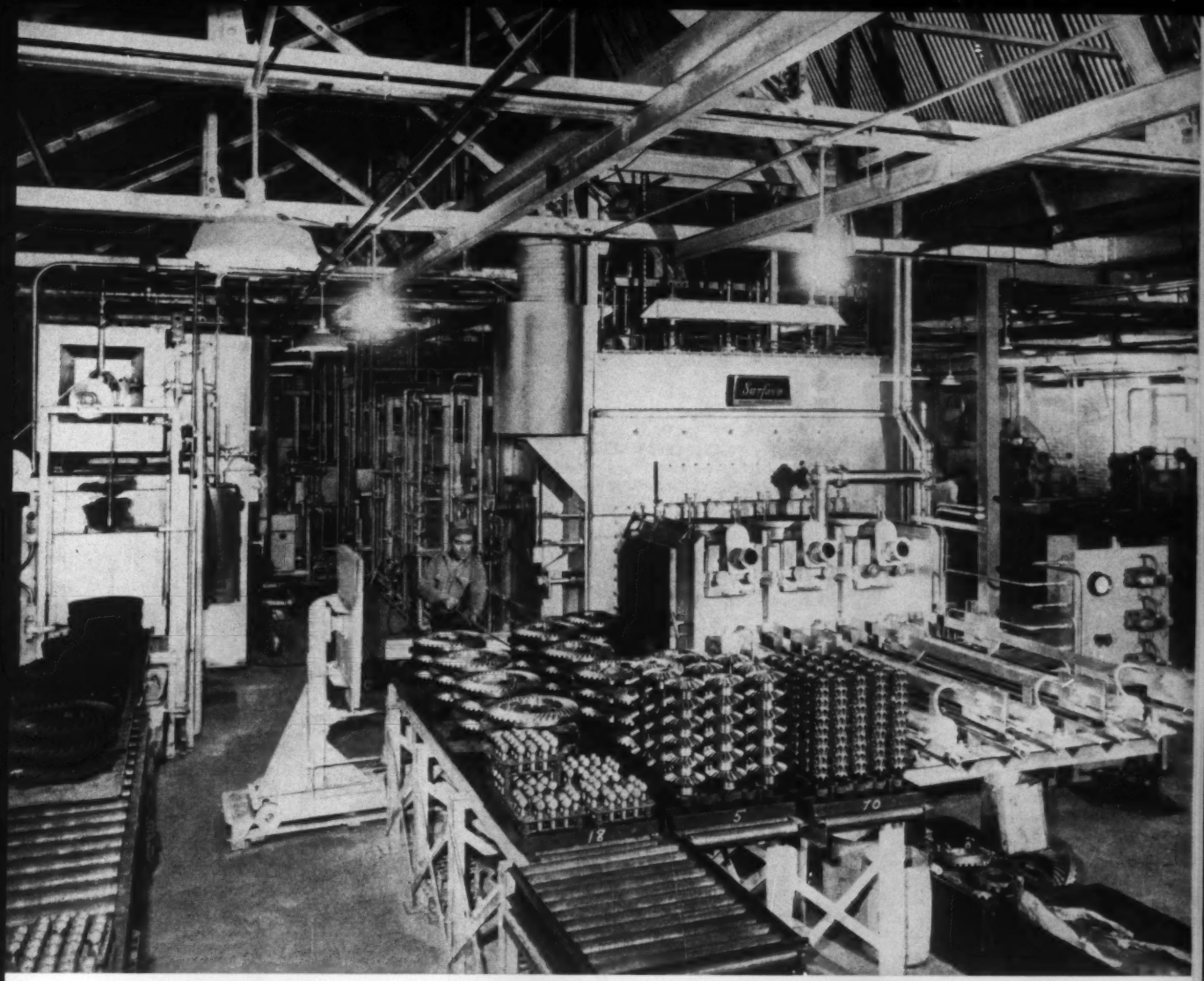
For more data circle No. 45 on postcard, p. 85



Welding Unit Suits Research and Production Jobs

This electron-beam welder achieves high-power density at electron voltages below 30 kv. It welds various refractory and reactionary metals, in the lab as well as the shop. In operation, the vacuum chamber pumps achieve 1×10^{-4} mm-hg vacuum in about four minutes. Then the electron gun and power supply produce a beam of 350 milli-amps at 30 kv. Recently, this low-voltage system welded 1¾-in. aluminum plate with a depth-to-width weld ratio of 22:1. The beam spot focuses into 0.030-in. minimum diameter. Over 1-in. diameter is the maximum. The low-voltage design eliminates X-ray hazards. (Sciaky Bros., Inc.)

For more data circle No. 46 on postcard, p. 85



Continuous carburizing furnace replaces pack processing at a profit.

Several pack carburizing furnaces have been replaced by one Surface continuous gas carburizing furnace which has paid off for the White Motor Company.

They have improved the quality and uniformity of finished parts as a result of superior process control. At the same time, they are cutting inspection costs and realizing more efficient floor space utilization. Costly supply inventories required by former processes have been eliminated.

Atmosphere carbon potential in two of the five furnace zones is monitored automatically by a Surface Autocarb® System. Parts requiring press quenching are removed through a special slot door at right angles to the regular discharge door. The 57′ furnace carburizes 700 pounds/hour of ring gears, spider gears, studs, pins, and heavy parts.

Write for information: 2373 Dorr St., Toledo 1, Ohio. In Canada: 2490 Bloor St., West, Toronto.

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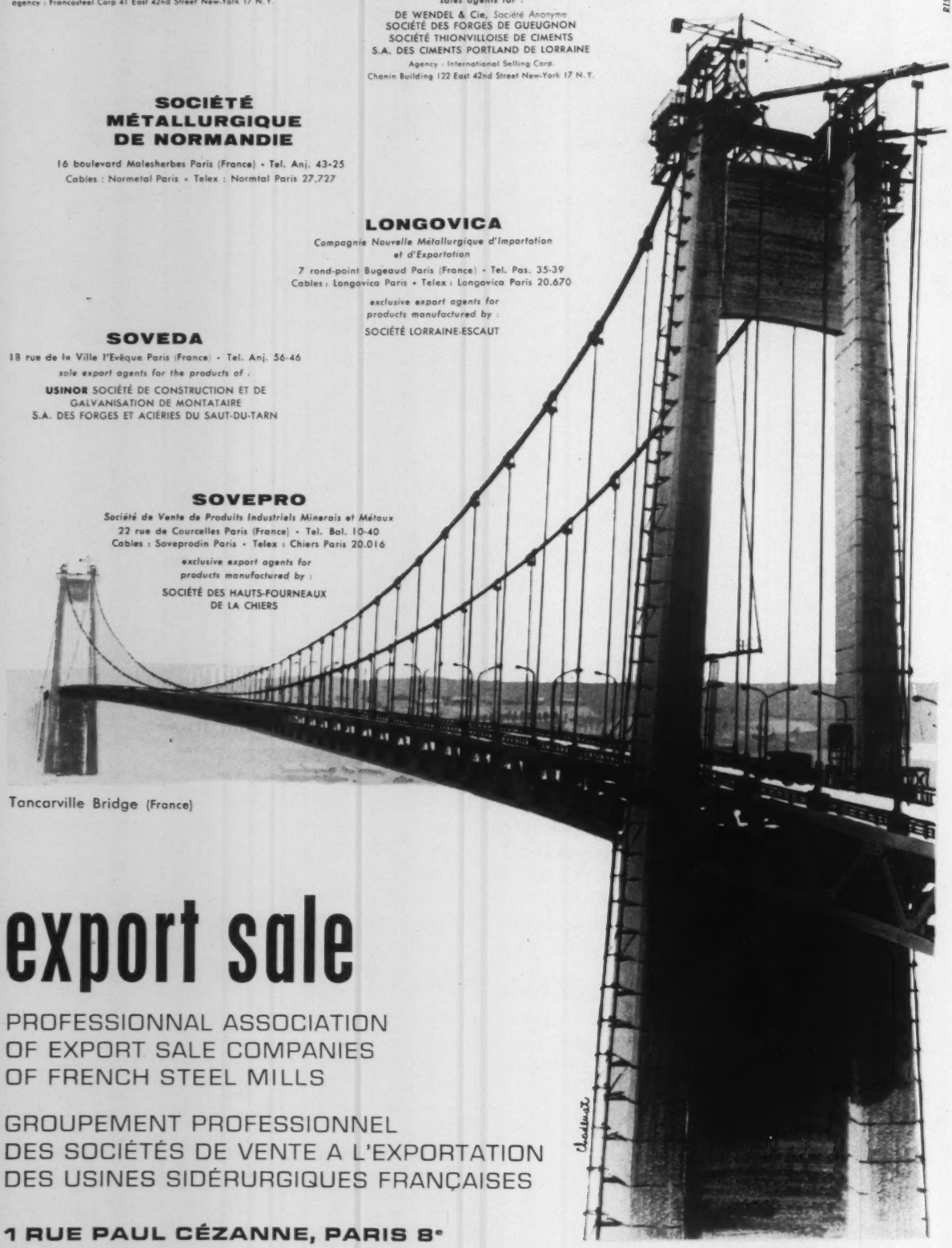

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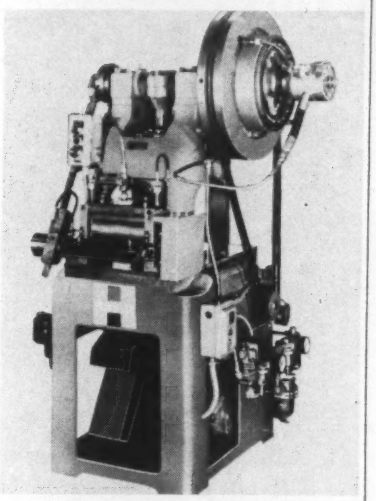
NEW EQUIPMENT

Automated Press

Speeds of 100-400 strokes per minute are standard with a new 16-ton fabrication press. A built-in lub system maintains full lubrica-



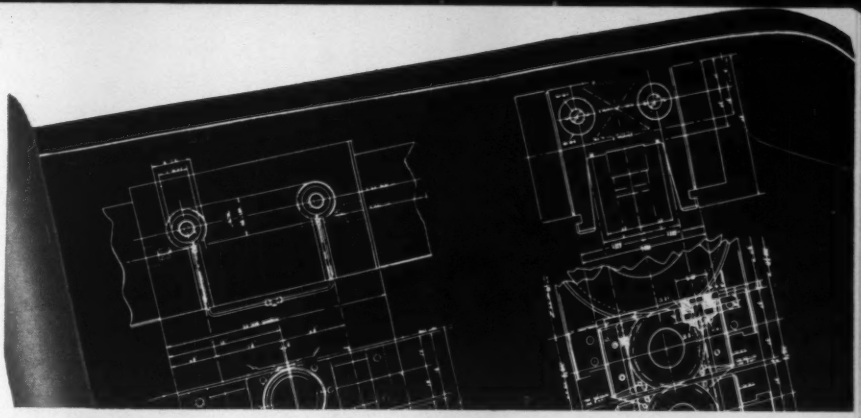
tion during high-speed operations. The press stops automatically in the event of a die jam or a misfeeding. This prevents costly die breakage. Crankshaft diameter is 2⅛ in. at the main bearings and 2½ in. at the crankpin. Stroke is 1 in. to 1½ in. to 2 in. (Havir Mfg. Co.)

For more data circle No. 47 on postcard, p. 85

High-Temperature Kiln

Constantly improved since its introduction, a compact kiln permits

firing at 3200°F in six hours or less. It uses any commercial fuel gas and blower air. An inspirating-type gas mixer insures a constant



Blueprint of a new process

by "YOUNGSTOWN"

One of Many Major Developments for Industry during 75 YEARS of Service

Have you heard about Work Roll Shaping? It's a unique method for assuring uniform flatness of steel strip. Reports from users of installations already in operation indicate remarkable results. This is just one of the recent "Youngstown" developments which improve rolling mill operations. Complete information will be furnished, without obligation, on any of the following:

- *Hydraulic Work Roll Shape Control*
  Improves the quality of strip—economically
- *Automatic, Heavy Duty, Contour Roll Lathes*
  Modern design for templet or numerical control
- *New Carriage-Type Stretcher Levelers*
  Sizes from 10,000# to 4,000,000#. Fast, efficient
- *500 fpm—81" Sheet Scrubber Line*
  Cleans sheets up to 76" wide and .250" thick
- *New Rotary-Type Plate Scrap Chopper*
  Unique reciprocating design prolongs knife life
- *Coil Processors and Scale Breakers*
  New concept of coil processing and scale breaking

Other recent contracts range from complete turnkey installations to auxiliary components. Whatever the need—large or small—you benefit from "Youngstown" experience.

THE YOUNGSTOWN FOUNDRY & MACHINE CO. 75th ANNIVERSARY SERVING INDUSTRY SINCE 1875

The Youngstown Foundry & Machine Co.

Youngstown 1, Ohio

Why Advertise At All?*

A new approach to the job of increasing sales effectiveness... which challenges everyone who has a sales responsibility.

If your job involves the creation of more sales, here at last is a tool you have needed for a long time. It can increase the impact of your total sales effort. It can put salesmen's time and talents to fuller, more productive use. It can pinpoint the most effective means of attacking a market. It can help to build sales volume to a degree considered "impossible" until now. *All at lower cost per dollar of sales!*

What is this new sales tool? A simple, analytical procedure which leads management—step-by-step—through its own sales objectives and its plans for achieving them. The result is a striking revelation. More often than not, it exposes a deficiency in the operation of a company. Management is made to realize, as never before, the true importance of "non-personal sales calls" and the vital part they play in increasing sales volume.

Beginning with the question, "Why advertise at all" the new approach goes on to firm up your company's or client's total market objective. It indicates how non-personal sales dollars can be stretched by applying sales effort with maximum efficiency. And to a major degree, it answers the basic question, "How should I allocate my sales budget for greatest effectiveness?" All in *actual figures*, pertinent to the *specific company*, which you insert in an easy-to-use workbook.

This new and unique approach to marketing goals is a *tested technique*. It is already proving to be one of the most useful tools ever developed for all who have a sales responsibility. As you might expect, the demand for this new tool is spreading rapidly. If your company or client sells anything to the metalworking market—companies that produce, fabricate, or use metal—your IRON AGE Regional Business Manager is ready to help you put our new concept to work. The tools are free. Call him now.

Atlanta, Ga. — JAckson 3-6791
Chicago, Ill. — RAndolph 6-2166
Cleveland, Ohio — SUperior 1-2860
Columbus, Ohio — CApital 1-3764
Dallas, Tex. — EMerson 8-4751
Detroit, Mich. — TRinity 1-3120
Hartford, Conn. — ADams 2-0486
Los Angeles, Calif. — SPring 2-1819
New York, N.Y. — OXford 7-3400
Philadelphia, Pa. — SHerwood 8-2000
Pittsburgh, Pa. — ATlantic 1-1830
San Francisco, Calif. — UNderhill 1-7107

* A management service of the IRON AGE — Copyright, 1961, The Chilton Company

air-gas ratio and permits single-valve operation. (Bickley Furnaces Inc.)

For more data circle No. 48 on postcard, p. 85

Detects Rail Flaws

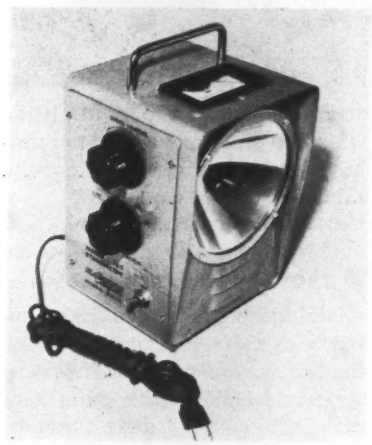
Completely transistorized, a portable rail-flaw detector pinpoints incipient cracks before a rail can fail

and cause an accident. Operation is simple. The operator walks along the track. He slides the transducer over the rail surfaces and listens for a signal in the headset. A change in tone indicates a crack, void or other defect. (Branson Instruments, Inc.)

For more data circle No. 49 on postcard, p. 85

Test Stroboscopes

Recommended for permanent and semi-permanent installations for inspecting products or processes,



motion-study stroboscopes provide 4000 flashes per minute. They can be used to "freeze" motion or to "slow down" on-the-go processes. Along with inspection applications, these new units are adaptable for photographic uses. Triggered-flash circuits match camera synchronization. (Slaughter Co.)

For more data circle No. 50 on postcard, p. 85

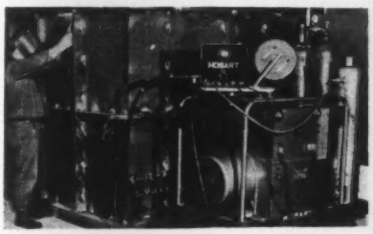
Halves Labor Costs

A counterbalanced floor crane cuts labor by 50 pct and increases handling capacity. Self - contained and maneuverable, it lifts 3000 lb with the hook four feet beyond the front of the platform. Hydraulic controls guide the boom movement. They give precision movement (0.01 inch) of the hook in six directions; up-down, in-out and right-left. Heavy loads don't affect precision. You can use the crane in the shop to change dies, molds, grinding wheels, motors, etc. (Vanguard Mfg. Co.)

For more data circle No. 51 on postcard, p. 85

Multi-Process Welder

Metal fabricators using more than one of the new semiautomatic weld-



ing processes simplify operations and reduce capital investments with a new "multi-wire" welding package. This multiple-process equipment includes a combination welder and a matched wire feeder. Both utilize all of the new semiautomatic processes. A family of welding guns has also been developed for each of the processes. (Hobart Brothers Co.)

For more data circle No. 52 on postcard, p. 85

Versatile Miller

A new horizontal boring, milling and drilling machine has a 40-ft bed and a 20-ft table. It advances the concept of standard components in a machine tailored to the customers' special needs at standard prices. Because of the building-block design concept, variations in table and bed length and column height are standard and available for unusual-

POSITIVE CORROSION CONTROL FOR STRUCTURAL STEEL

at 1/2 the average COST

in 1/2 the average TIME . . .

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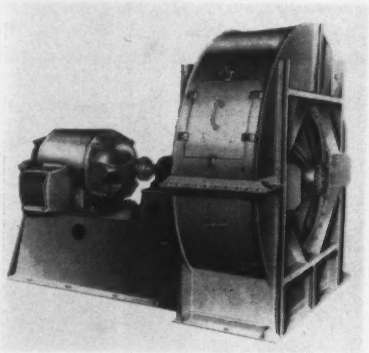
WILMINGTON 99, DELAWARE
PROTECTIVE COATINGS AND LININGS: GACOTE, NEOPRENE, HYPALON, URETHANE, EPOXY, VINYL, NATURAL RUBBER, PENTON

ly fast delivery. The table rides on special edge-grained plastic inserts to reduce friction. It's operated by separate thryatron controls. (S & S Machinery Co.)

For more data circle No. 53 on postcard, p. 85

Industrial Fan

Here's a new series of heavy-duty industrial fans which feature airfoil blading for high efficiency at direct-connected motor speeds. Direct drive means reliability in continuous operation. It also extends application possibilities where fan speeds or horsepower input exceed belt-drive limitations. With capacities from 15,000-450,000 cfm, the fans are available in five ac-motor speeds. One unusual feature is that the bearings are integral with the fan unit. The motor is directly connected to the fan shaft through couplings. Other advantages include heavy-steel construction, welded and reinforced throughout

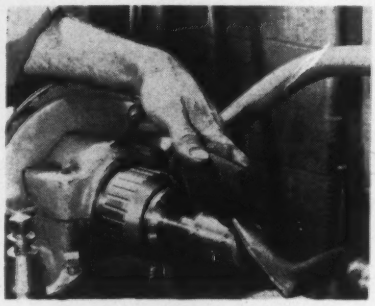


to prevent vibration. Split housings ease wheel removal and maintenance. (Westinghouse Electric Corp.)

For more data circle No. 54 on postcard, p. 85

Polish Away Rust

Nylon-web pads make it easy to remove rust, burrs and scratches from all types of metals. Each pad is impregnated with abrasive particles. These pads remove surface carbon, handmarks and stains. They



also clean copper anodes in plating tanks and scour molds used in forming plastic and glass. (Minnesota Mining and Mfg. Co.)

For more data circle No. 55 on postcard, p. 85

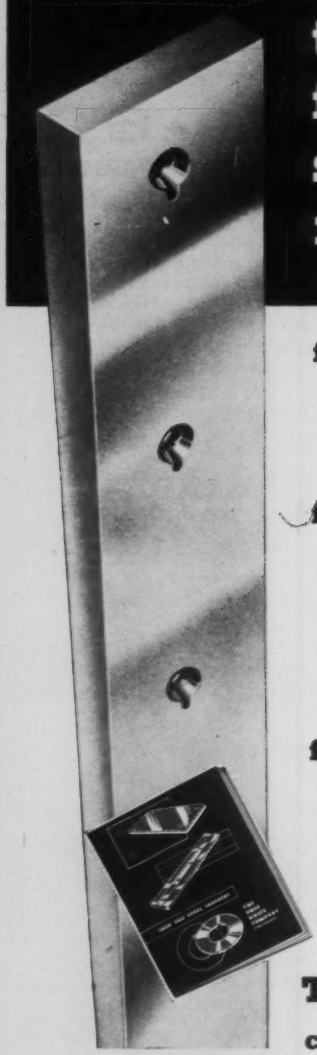
Automatic Lathes

Maintaining high-production output with close tolerances and fine finishes is problem posed to most shops machining small parts. One manufacturer of diesel engines solved it by switching outside-finishing operations on injector nozzles to two automatic lathes. Traditionally, these parts were finished by multi-spindle machine tools. Because of the rigid specs on outside

save time and money

OHIO KNIFE CO.

the one source for all your shear blade requirements



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Save on inventory! We carry in stock for immediate delivery, blades for all makes of square shears. You also save because our blades last longer between regrinds.

for all shearing

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OK DURA-CHROME grade for shearing hot or cold plate up to 1½" or equivalent.

OK UTILITY grade for heavy short runs and heavy plate.

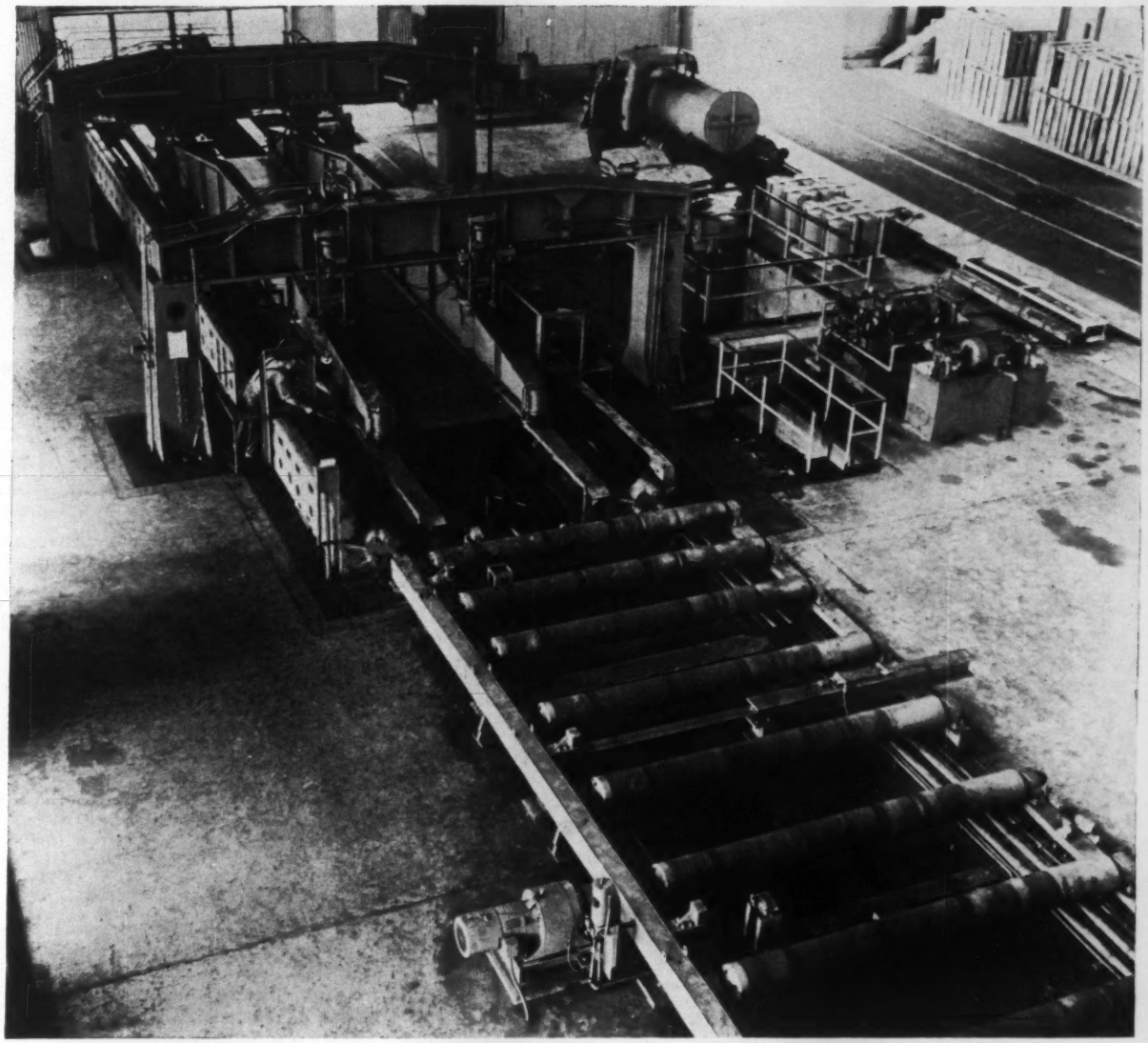
for any shear

Our blades are used as standard equipment by shear builders. They are also purchased as replacements by users when ordinary blades wear out.

For FREE 8 page Bulletin-C, write Dept. 124-FF.

THE OHIO KNIFE CO.

CINCINNATI 23, OHIO



PLANING TIME ALMOST HALVED

New Birdsboro plate planer cuts on back stroke, positions, and ejects on forward stroke

■ Here's how this new Birdsboro planing equipment speeds production of large diameter welded pipe: On the forward stroke it brings a new plate into position and automatically ejects a finished plate. On the back stroke it cuts both sides, then repeats the cycle. The planer's advantages to its user include a virtual halving of planing time . . . allowing production of three miles of 18″ to 42″ O.D. pipe per *day*.

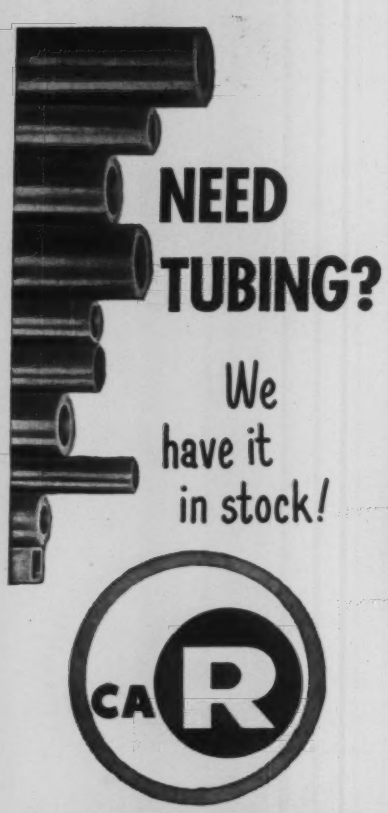
For details on this—and other—unusual mill machinery that delivers significant user benefits, write: *Sales Department, Engineering Department and Mfg. Plant:* Birdsboro, Pa., *District Office:* Pittsburgh, Pa.

MM1-61

BIRDSBORO

CORPORATION BIRDSBORO, PENNA.

STEEL MILL MACHINERY • HYDRAULIC PRESSES • CRUSHING MACHINERY • SPECIAL MACHINERY • ROLLS • ELECTRIC STEEL CASTINGS: Carbon, Low Alloy and STAINLESS STEEL



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Steel & Aluminum Tube Specialists
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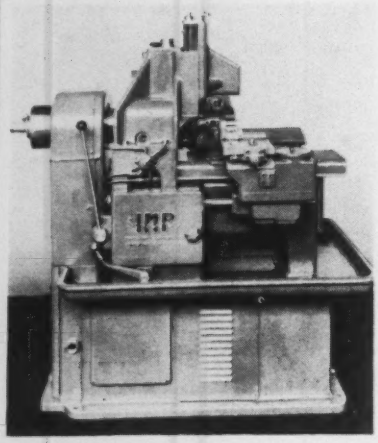
NEW EQUIPMENT

finishing, the multi-spindle machines experienced a lot of down time. Switching the job to these new

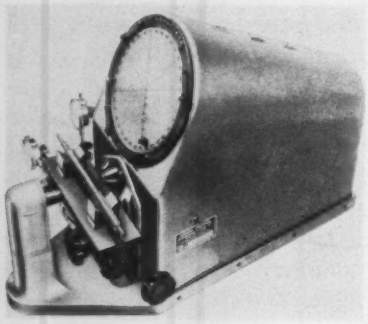


lathes boosted production and cut down on work stoppages. The multi-spindle tools now are used to better advantage. The new automatic lathes are rugged high-speed machines, capable of extreme accuracy. (Seneca Falls Machine Co.)

For more data circle No. 56 on postcard, p. 85

Optical Comparator

A newly-designed optical comparator features rugged construction and sustained accuracy. It's now available, at relatively-low cost. Designed to fit the needs of small shops and engineering and technical schools, as well as larger manufacturing companies, the unit is portable and light in weight. It enables any shop to maintain high

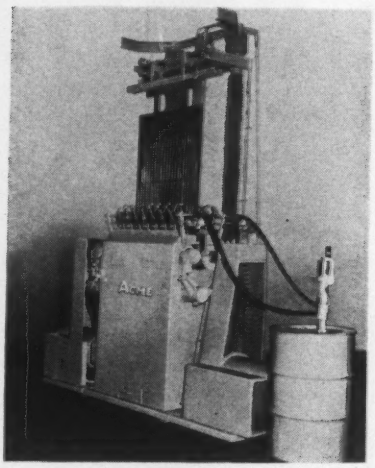


accuracy and efficiency. Weight is only 35 lbs. Also special-design features ban distortion. This assures reliable readings at any point on the screen. You get true magnifications in the outer image zones because non-radial straight lines do not appear bent. (Rankin Bros. Engineering & Sales, Inc.)

For more data circle No. 57 on postcard, p. 85

Buffs and Polishes

A high-production vertical polishing and buffing machine simultaneously finishes both sides of flat, angular or irregularly-shaped parts. It accommodates parts up to 48-in. long x 36-in. wide. If only one side needs finishing, parts such as flat sheets can usually be placed back to back. Of course, this doubles the production rate. Basically, the machine consists of a working head that carries the fixtures. This head turns the work vertically and horizontally between two rotating abrasive or buffing

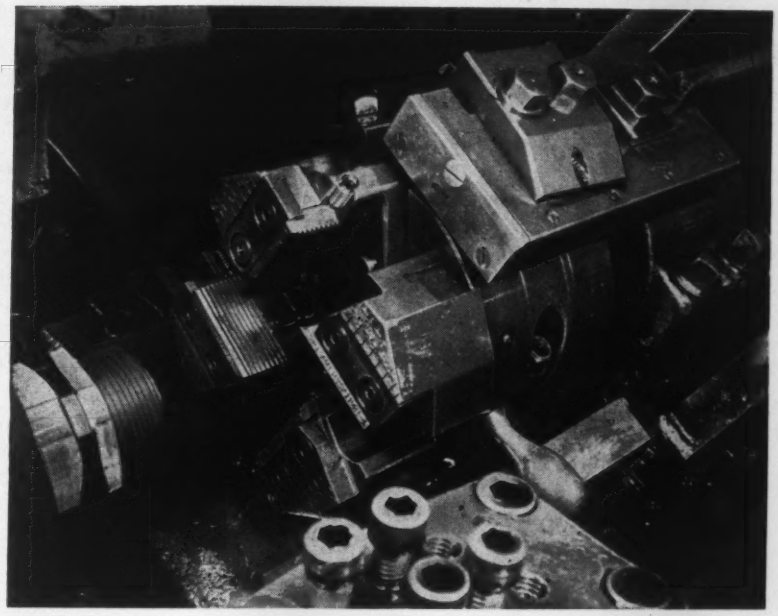


rolls. This eliminates any possibilities of streak marks. (Acme Mfg. Co.)

For more data circle No. 58 on postcard, p. 85

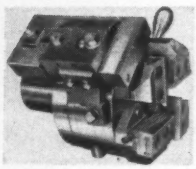
Boring Machine

With exceptionally rugged fixturing, a precision boring machine holds tolerances of 0.0005 in. on a 25-in. planet-pinion carrier. To start the cycle, the operator crane loads a component into the fixture. Then, he hand clamps it. The machine table moves to the left, and the boring quill enters the workpiece as the facing head finishes two faces. At the end of this stroke, the two boring tools are ready to bore the bearing diameters. The facing head returns in feed and faces another sur-



STAINLESS STEEL TAPERED THREADS

cut with Better Finish, Longer Tool Life



1½" Tapered Pipe Threads are cut in 304 stainless steel reducing bushings at Camden Machine Company, New Haven, Conn. These threads are produced by a 1¼" LANDMATIC Taper Attachment Head on a 3¼" Gridley single-spindle automatic at 15 surface feet per minute.

The thread finish is greatly improved from previous methods and 1000 pieces are completed between chaser grinds—an increase of more than 10 times.

These improved results can be entirely attributed to the use of the Taper Attachment and the free cutting action of the Landis Tangential Chaser. Through the Taper Attachment, cutting action is limited to the throat section or chamfer of the chaser, allowing the thread to be cut quickly with little "cold-working." This action reduces cutting strains to a minimum and results in uniform tapered threads.

LANDIS Taper Attachment Heads are stationary self-opening heads for cutting tapered threads of all types. Six sizes of heads thread all diameters from ¼" to 6". Ask for Bulletin F-90.

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

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NEW . . . ALL NEW . . . FROM

KALAMAZOO

The "BIG K"

Now, after more than four years' research, Kalamazoo brings to you the all new Model 14A — horizontal metal cutting bandsaw. Incorporating some 30 shop proven, cost saving features, this hydraulic driven, heavy duty bandsaw offers cutting capacity and ability in excess of any cut-off method, at far less tool cost per square inch of cutting.

Most important among these profit producing features are: positive control force feed; clockwise blade rotation to reduce teeth shock — increase blade life; convenient 36" machine height to reduce operator fatigue; large 14" x 24" capacity; push button control; dual movable vise jaws; adjustable blade tension.

For complete details on this amazing new machine tool, phone, write or wire your Kalamazoo representative. Facilities for test runs of your material on the "Big K" are at your disposal — at no obligation.

MACHINE TOOL DIVISION
Kalamazoo Tank & Silo Company

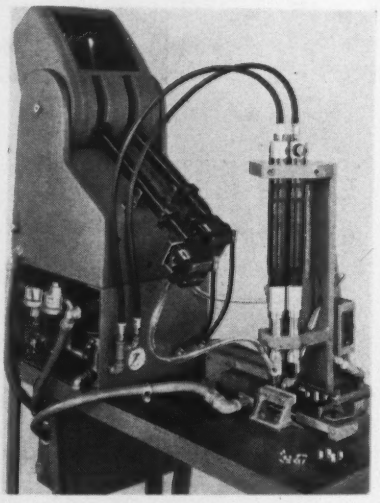
508 Harrison St.
Kalamazoo, Mich.

face. Once this is done, the head clears the component from the machine. (Ex-Cell-O Corp.)

For more data circle No. 59 on postcard, p. 85

Drives Those Screws

In operation, a new, dual-spindle screwdriving machine uses a shuttle-type fixture to push the part into position. A nylon pressure pad holds it there. Then, when the part is centered under the driving head, contacting a limit switch starts the drivers. Two air-fed screwdrivers take over and automatically place the screws. Completed parts unload into

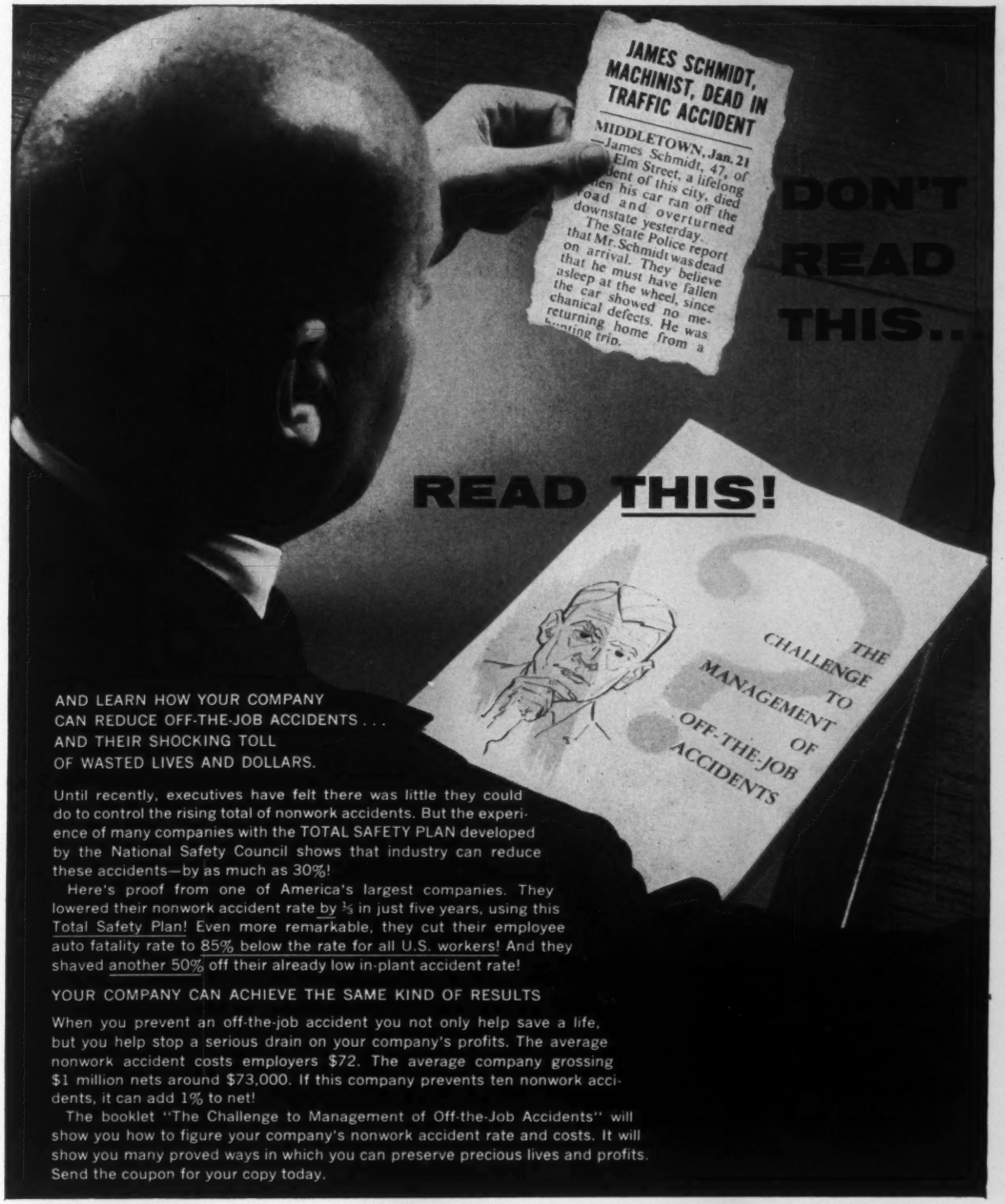


a chute. The new machine uses normal shop-air pressure to operate the driving heads. Forty lb of air pressure operate the metering device that feeds the screws. (Clyde Engineering & Mfg. Co.)

For more data circle No. 60 on postcard, p. 85

Heat-Treating Furnace

Those performing critical heat-treating processes, such as reducing tungsten-oxide powder to pure tungsten metal, will find this electric furnace of special interest. It's a 3-zone, straight-line unit, designed for a hydrogen atmosphere. There's a pre-heat zone, a central high-temperature zone and a water-cooled exit zone. Both entrance and exit ends have counter-balanced, sliding-plate doors. A solenoid operates the flame curtain. To guard against


JAMES SCHMIDT, MACHINIST, DEAD IN TRAFFIC ACCIDENT
MIDDLETOWN, Jan. 21 —James Schmidt, 47, of Elm Street, a lifelong ...dent of this city, died ...hen his car ran off the ...oad and overturned downstate yesterday. The State Police report that Mr. Schmidt was dead on arrival. They believe that he must have fallen asleep at the wheel, since the car showed no mechanical defects. He was returning home from a ...ting trip.
DON'T READ THIS...
READ THIS!
THE CHALLENGE TO MANAGEMENT OF OFF-THE-JOB ACCIDENTS

AND LEARN HOW YOUR COMPANY
CAN REDUCE OFF-THE-JOB ACCIDENTS . . .
AND THEIR SHOCKING TOLL
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Until recently, executives have felt there was little they could do to control the rising total of nonwork accidents. But the experience of many companies with the TOTAL SAFETY PLAN developed by the National Safety Council shows that industry can reduce these accidents—by as much as 30%!

Here's proof from one of America's largest companies. They lowered their nonwork accident rate by ⅓ in just five years, using this Total Safety Plan! Even more remarkable, they cut their employee auto fatality rate to 85% below the rate for all U.S. workers! And they shaved another 50% off their already low in-plant accident rate!

YOUR COMPANY CAN ACHIEVE THE SAME KIND OF RESULTS

When you prevent an off-the-job accident you not only help save a life, but you help stop a serious drain on your company's profits. The average nonwork accident costs employers $72. The average company grossing $1 million nets around $73,000. If this company prevents ten nonwork accidents, it can add 1% to net!

The booklet "The Challenge to Management of Off-the-Job Accidents" will show you how to figure your company's nonwork accident rate and costs. It will show you many proved ways in which you can preserve precious lives and profits. Send the coupon for your copy today.

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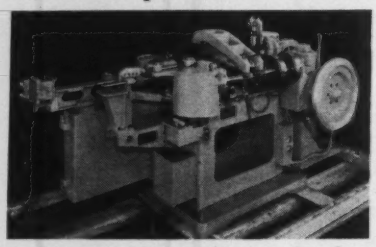
protective-atmosphere loss, interior blast gates separate the entrance area and the exit area. (Pereny Equipment Co., Inc.)

For more data circle No. 61 on postcard, p. 85

Stamping Machine

Designed to reduce the piece-part costs of formed stampings, a high-speed unit uses a 5-hp variable-speed drive to obtain outputs of 80-400 strokes per minute. Standard

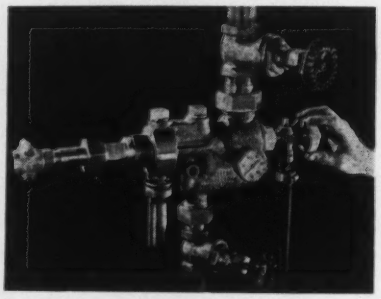


equipment consists of one complete die head with cam, a back plate, tie bar, four high-speed forming slides with cams, a stripper device, stock-check mechanism, brake and an automatic lubrication system. (U. S. Tool Co., Inc.)

For more data circle No. 62 on postcard, p. 85

Cleaning Units

Hydraulic-cleaning units are available in Type 304 stainless steel for use where radioactivity is present or corrosion resistance is a must. They clean walls, floors, process vessels and other equipment.

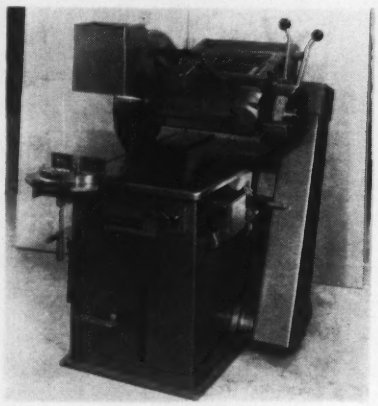


With pressures up to 630 psi, the units discharge from 500-1575 gph. (Sellers Injector Corp.)

For more data circle No. 63 on postcard, p. 85

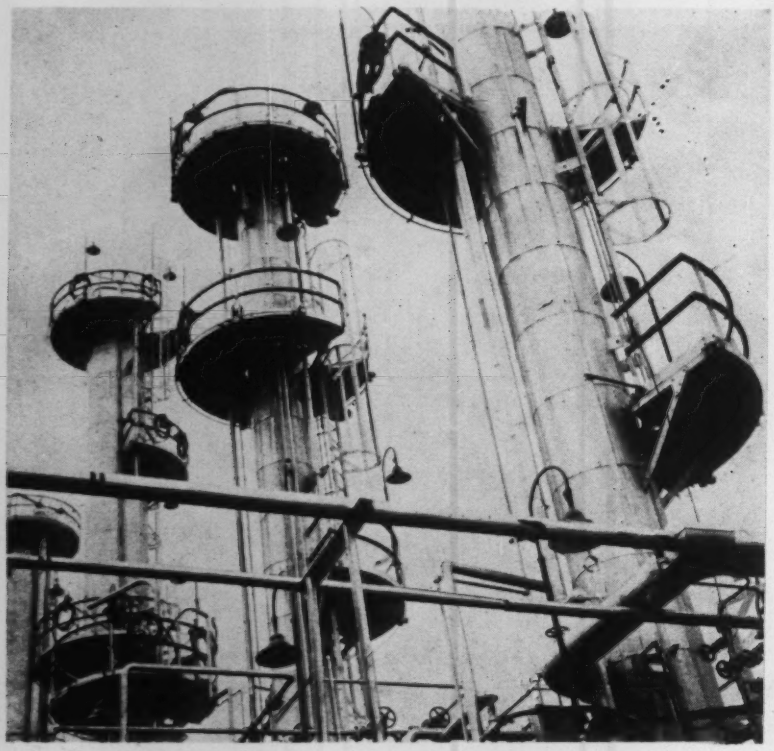
Saw Needs No Coolant

With an integral pedestal grinder, a high-speed saw provides fabrication and maintenance shops with an economical general-purpose tool. It makes accurate cuts on all types of carbon and stainless steels. It's also



adaptable to cutting many of the new alloys, without clamping or coolants. Straight cuts, mitres, notches and incisions can be made by either free-hand or table cutting. (Production Machinery, Inc.)

For more data circle No. 64 on postcard, p. 85



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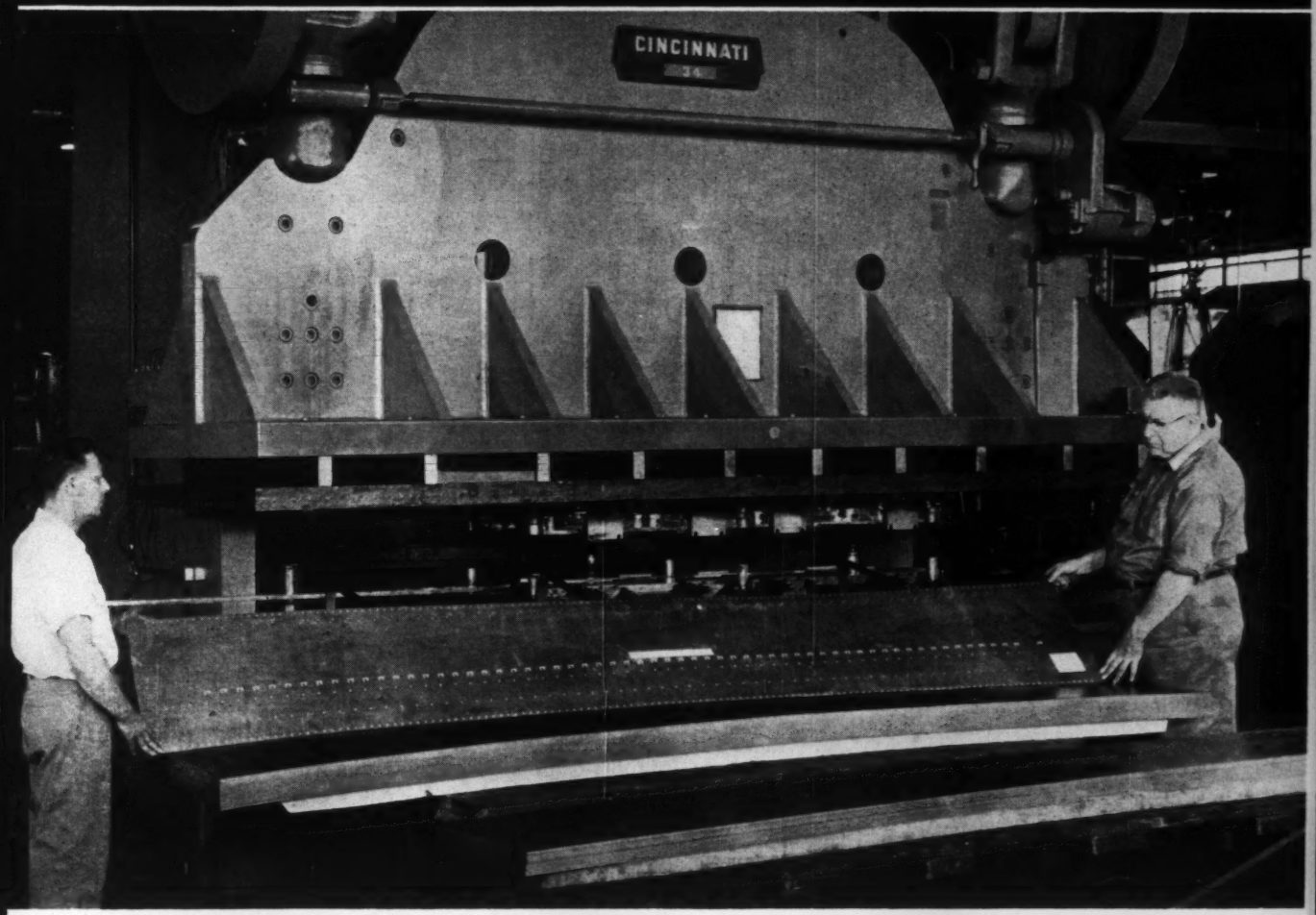

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Automakers' Steel Buying Plans

Automakers aren't letting the threat of a strike in September upset plans for production of first 1962 models.

Inventories, rather than labor problems, dictate steel buying.

■ Steel buying plans of the auto industry are largely ignoring the threat of a strike by the United Auto Workers late this summer. Steel buying plans for July and August are moving along normally, in spite of the Aug. 31 deadline in negotiations with the UAW.

The dilemma faced by automakers is this: A strike in September could leave them with over 200,000 unsold 1962 models on their hands, well in advance of introduction dates. Holding the cars, and maintaining security through a strike, poses the problem. But this possibility is not influencing steel buying decisions at this time.

Wait Until August—Most automakers are acting on the theory that there won't be a strike. They concede the strike danger, but say the situation won't clear until late August. So the labor threat is not influencing steel buying in Detroit now.

Purchasing agents in General Motors, Ford, and, Chrysler all confirm that contract negotiations aren't a factor in summer steel orders. Instead, an orderly cleanup of 1961 models and a good introduction of 1962 lines dominate the thinking in Detroit.

Inventories Are Key—In fact, steel inventories, both of new cars and steel, not labor, still control the buying policies of the automakers.

This is supported by steel sales offices in Detroit, which have not noticed any effects of auto labor negotiations on steel buying. There's no great bulge or hole in August orders.

These buying plans of a smaller automotive division show the pattern of automotive steel buying. Tonnage may vary widely, depending on the size of the automaker, but the pattern is representative.

Tonnage Figures — The automaker ordered 2500 tons of steel for June delivery, 2400 tons for July, will order 8000 tons for August, and, barring a strike, 8000 tons for September. The final quarter will average 8000 tons per month.

Meanwhile, inventory control is unchanged from earlier in the year for most automakers. For example, no General Motors plant is carrying over a 21-day supply of steel. Any buyer who wants to go over this level has to have good reasons. Recently, many plants have been carrying as low as 14 days inventory because of the coming changeover period.

The generally low level of stocks of auto steel have resulted in frequent requests for emergency orders, sometimes as low as 25 tons for a specific product to round out schedules.

Market Outlook—July steel orders by automakers may drop 20 pct below June. But August looks good and September better. If there is no auto labor strike, September could be the best month of the year for auto steel shipments. What happens in the late months of the year depends on September - October auto sales.

On the overall steel market, The IRON AGE adds that late orders for July came at a rate that indicates July will show no more than a 10 pct drop from June. Steel people have been saying this right along, but with private misgivings.

District Steel Production Indexes 1957-59=100

	Last Week	Two Weeks Ago	Month Ago	Year Ago
North East Coast	N.A.	101	106	54.0
Buffalo	N.A.	84	120	41.0
Pittsburgh	N.A.	93	98	35.0
Youngstown	N.A.	89	103	12.0
Cleveland	N.A.	123	122	41.0
Detroit	N.A.	134	144	65.0
Chicago	N.A.	114	115	46.0
Cincinnati	N.A.	118	118	29.0
St. Louis	N.A.	120	123	56.0
Southern	N.A.	117	108	60.0
Western	N.A.	122	121	62.0
U. S. Index	*103.0	106.2	111.5	44.0

Source: American Iron & Steel Institute — *Estimate

Steel Production, Composite Prices

Production	Last Week	Two Weeks Ago	To Date 1961	To Date 1960
(Net tons, 000 Omitted)	1,918*	1,978	45,064*	60,130
Ingot Index				
(1957-59=100)	103.0*	106.2	92.5*	125.8
Composite Prices	This Week	Week Ago	Month Ago	Year Ago
Finished Steel base (Cents per lb)	6.196	6.196	6.196	6.196
Pig Iron (Gross ton)	$66.44	$66.44	$66.44	$66.41
Scrap No. 1 hvy (Gross ton)	$36.83	$37.17	$36.83	$31.00
No. 2 bundles	$24.17	$24.17	$24.17	$20.83

Materials Management Pushed

Purchasing men agree that tighter inventory control is here to stay.

And with this is coming a definite trend toward the new materials management concept.

▪ Tighter inventory controls spurred by the recession are here to stay.

This was the consensus at the National Assn. of Purchasing Agents convention. It's also the firm conviction of Joe Price, American Pulley Co.

In charge of all purchasing functions, Mr. Price has a new title and wider scope of responsibility. Aim is to enlarge inventory control techniques along the materials management concept. As Director of Material, Mr. Price will head a team of four purchasing men directly concerned with this program.

Wider Trend—A year ago, purchasing agents across the nation went all out to reduce top-heavy stocks. Companies pressed for lower operating costs through better management of materials.

After time, trial and error, buyers reached their goals. Now the economy is starting to move again.

But the lessons learned in the "tight time" won't be forgotten quickly. Many procedures adopted then now form integral parts of purchasing systems.

Close Relations—Under his new system, Mr. Price is seeking closer relationships between production and customer sales and service.

Intensive use of EOQ, (Economic Order Quantity) blanket orders and cost analysis are some of the new techniques he is using.

"Blanket orders, for one thing, have enabled us to cut our stocks," he says. "We have less out-of-stock items as a result."

Order Change—One data processing revision has given him more direct inventory control of some parts.

"In the past, customer service would issue a call-for-order slip to a manufacturer for any product we make. It would go to production control and they would make a drawout on their Kardex and issue a requisition for the purchased parts.

"Under the new process, we bypass production control. The order is now issued directly to purchasing.

"This enables us to buy larger quantities less frequently," he says.

Exploded Sales — He uses new EOQ methods as the main means of controlling inventories on purchased items. The "exploded sales" approach is used.

"We take the average of sales of each product item by item for a six-month period. This is then multiplied by lead time and transportation time to help us get our Economic Order Quantity."

Better Balance—"Our inventory now is much better balanced," says Mr. Price. "And the control system we set up last fall on an order-point-order quantity basis will be continued."

He has served 15 years with American Pulley, a new subsidiary of Van Norman Industries, Inc., as a purchasing agent. He spends $2.5 million annually on purchased goods and services. Steel and cast iron products are the biggest expenditures.

"Business is much better now," he says. "Backlogs are not yet what we would like them to be. But we hope to see great gains by the fourth quarter."

PA's: Managers or Clerks?

A university professor revived the purchasing-vs-materials controversy at the recent convention of the National Assn. of Purchasing Agents.

Prof. William P. Stilwell, assistant director, Management Institute, Univ. of Wisconsin, contends:

1. Unless purchasing men believe in the materials management concept, they are not thinking in the language of top management.

2. The cost-profit squeeze is forcing more companies to look at materials management as a possible answer to their profit problems.

3. Purchasing men are most likely candidates for materials manager positions "because of their knowledge of materials, markets, prices, and manufacturing processes."

4. Managers are being selected from production planning and control, accounting, and engineering, rather than purchasing. "The men in these activities are widening their horizons and doing broader management thinking."

5. Only 20 pct of purchasing people now fulfill the professional status of manager. The vast majority, about 65 pct, are in the clerical level. The remaining 15 pct are in the technical skills category of buyer.

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Stainless Prices Increased

Bulletin—Crucible Steel Co. of America was the first to follow up increases in nickel prices (see p. 120) with increases in prices of nickel-bearing grades of stainless.

The price increases are effective July 5.

Grades and increases follow:

Grades 201 and 202, up 0.5 cents per lb; 303, up 0.75 cents per lb; 302, 304, 304-L, up 1 cent per lb; 316, 321, and 347, up 1.25 cents per lb; 310, up 2.25 cents per lb.

Crucible spokesman said the increases are due solely to the increases in nickel, announced last week by the International Nickel Co.

The move to change base prices is the latest in a series of price manipulations in stainless steel.

▪ Stainless producers indicate they will make no move to change a price gap that may give all sheet business to warehouses.

This is the initial mill reaction to last week's cutting of stainless sheet prices by warehouses.

The mills say sheets were primarily a warehouse item anyway. Seventy-five percent of all shipments were to warehouses in the first quarter. They point out, moreover, that there is no way they can meet the new warehouse prices under the present discount system.

Undersell Mills—In effect, say the mills, the warehouses have cut their own allowances in half. This was being done on an unofficial basis before, they say; now, the cut has been spelled out officially.

The mills are taking the position that this is strictly a warehouse problem. One product manager admits the new structure points to the elimination of direct mill sales of sheets. There would be no point in a customer buying from a mill at the full price when he could get discounts of 5 or 6 pct from the warehouse. However, it is pointed out again that warehouses were already underselling the mills on an unofficial basis.

Ten Pct Allowance—If the mills did reduce their prices, warehouses could still undersell them. Stainless sheet has a 10 pct distributor allowance. The warehouse would have the same margin for discounting at any level the mills went to.

There is apparently no thought of eliminating or reducing the distributor allowance on sheets. An attempt was made recently to reduce the allowance on strip from 5 pct to 2.5 pct. The move did not receive general mill support and had to be abandoned.

Mills Not Resisting—Conceivably, the mills could set up a separate price schedule on orders calling for direct customer shipment. However, there is no indication yet that anyone intends to fight the trend toward warehouse selling in this manner.

Other stainless products have apparently not yet been hit by discounting to the extent of sheet. There is a 10 pct distributor allowance on bar, wire, sheet and billets. In the first quarter, warehouses accounted for 72 pct of cold finished bar shipments and 49 pct of hot rolled bar. Strip has a 5 pct allowance and only 20 pct was sold through warehouses in 1960.

Bars Less Vulnerable—One producer feels bars are less vulnerable to discounting because product variety makes stocking a more expensive proposition. Also, says this mill, bars are sold by established warehouses to a great extent, whereas sheet is carried by building product suppliers and many others outside the normal steel distributor system.

Plates and Shapes—Price extras for plates have been revised. Changes are described as minor by purchasing agents and mills. They involve changes in width brackets; the use of actual or theoretical weight, whichever is less, for item quantity extras; the publishing of extras for restrictive tolerances and several others. Extras for structurals have also been changed.

As an example, the width brackets formerly were such that a user could save 15¢-20¢ by ordering a plate 60¼-in. wide instead of 60 in. Most users were adding a fraction of an inch to get the savings. Now, they can order the exact width without a penalty.

Sheet and Strip—Sheet sales are moving generally sideways, says one **Pittsburgh** producer. July will be down from June, but the whole period from May through August is seen as roughly on a plateau. The drop will be a little sharper in **Detroit** where it is expected that July orders will be as much as 20 pct below June. However, this is due to 1961-model phase-out.

PURCHASING AGENTS CHECKLIST

Tool steel producers believe sales will move off the low-level plateau and start moving up again. p. 43

Computer sales and rentals will climb steadily for the next decade. Lower-cost units are planned. p. 46

Chipless forming through cold extrusion is a growing trend. p. 69

COMPARISON OF PRICES

(Effective June 30, 1961)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price changes from previous week are shown by an asterisk (*).

	June 30 1961	June 26 1961	May 29 1961	June 28 1960
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	5.10¢	5.10¢	5.10¢	5.10¢
Cold-rolled sheets	6.275	6.275	6.275	6.275
Galvanized sheets (10 ga.)	6.875	6.875	6.875	6.875
Hot-rolled strip	5.10	5.10	5.10	5.10
Cold-rolled strip	7.425	7.425	7.425	7.425
Plate	5.30	5.30	5.30	5.30
Plates, wrought iron	14.10	14.10	14.10	14.10
Stainl's C-R strip (No. 302)	49.50	49.50	52.00	52.00
Tin and Terneplate: (per base box)				
Tin plates (1.50 lb.) cokes	$10.65	$10.65	$10.65	$10.60
Tin plates, electro (0.50 lb.)	9.35	9.35	9.35	9.35
Special coated mfg. ternes.	9.90	9.90	9.90	9.90
Bars and Shapes: (per pound)				
Merchant bar	5.675¢	5.675¢	5.675¢	5.675¢
Cold finished bar	7.65	7.65	7.65	7.65
Alloy bar	6.725	6.725	6.725	6.725
Structural shapes	5.50	5.50	5.50	5.50
Stainless bars (No. 302)	46.75	46.75	46.75	46.75
Wrought iron bars	14.90	14.90	14.90	14.90
Wire: (per pound)				
Bright wire	8.00¢	8.00¢	8.00¢	8.00¢
Rails: (per 10 lb.)				
Heavy rails	$5.75	$5.75	$5.75	$5.75
Light rails	6.725	6.725	6.725	6.725
Semifinished Steel: (per net ton)				
Rerolling billets	$80.00	$80.00	$80.00	$80.00
Slabs, rerolling	80.00	80.00	80.00	80.00
Forging billets	99.50	99.50	99.50	99.50
Alloys, blooms, billets, slabs	119.00	119.00	119.00	119.00
Wire Rods and Skelp: (per pound)				
Wire rods	6.40¢	6.40¢	6.40¢	6.40¢
Skelp	5.05	5.05	5.05	5.05
Finished Steel Composite: (per pound)				
Base price	6.196¢	6.196¢	6.196¢	6.196¢

	June 30 1961	June 26 1961	May 29 1961	June 28 1960
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$70.68	$70.68	$70.68	$70.57
Foundry, South Cin'ti.	71.92	71.92	71.92	73.87
Foundry, Birmingham	62.50	62.50	62.50	62.50
Foundry, Chicago	66.50	66.50	66.50	66.50
Basic, del'd Philadelphia	70.11	70.11	70.11	70.07
Basic, Valley furnace	66.00	66.00	66.00	66.00
Malleable, Chicago	66.50	66.50	66.50	66.50
Malleable, Valley	66.50	66.50	66.50	66.50
Ferromanganese 74-76 pct Mn. cents per lb.‡	11.00	11.00	11.00	11.00
Pig Iron Composite: (per gross ton)				
Pig iron	$66.44	$66.44	$66.44	$66.41
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$35.50*	$36.50	$35.50	$30.50
No. 1 steel, Phila. area	38.50	38.50	39.50	33.50
No. 1 steel, Chicago	36.50	36.50	35.50	29.00
No. 1 bundles, Detroit	35.50	35.50	34.50	27.50
Low phos. Youngstown	40.50	40.50	40.50	33.50
No. 1 mach'y cast, Pittsburgh	45.50	45.50	45.50	49.50
No. 1 mach'y cast, Phila.	49.50	49.50	49.50	51.50
No. 1 mach'y cast, Chicago	48.50	48.50	47.50	45.50
Steel Scrap Composite: (per gross ton)				
No. 1 hvy. melting scrap	$36.83*	$37.17	$36.83	$31.00
No. 2 bundles	24.17	24.17	24.17	20.83
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.75-15.50	14.75-15.50	14.75-15.50	14.75-15.50
Foundry coke, prompt	18.50	18.50	18.50	18.50
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	31.00	31.00	31.00	33.00
Copper, Lake, Conn.	31.00	31.00	31.00	33.00
Tin, Straits, N. Y.	117.875†	119.25*	111.125	101.75
Zinc, East St. Louis	11.50	11.50	11.50	13.00
Lead, St. Louis	11.00	11.00	11.00	11.80
Aluminum, ingot	26.00	26.00	26.00	28.10
Nickel, electrolytic	74.00	74.00	74.00	74.00
Magnesium, ingot	36.00	36.00	36.00	36.00
Antimony, Laredo, Tex.	29.50	29.50	29.50	29.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite

Weighted index of steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strip.

Pig Iron Composite

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo and Birmingham.

Steel Scrap Composite

Average of No. 1 heavy melting steel scrap and No. 2 bundles delivered to consumers at Pittsburgh, Philadelphia and Chicago.

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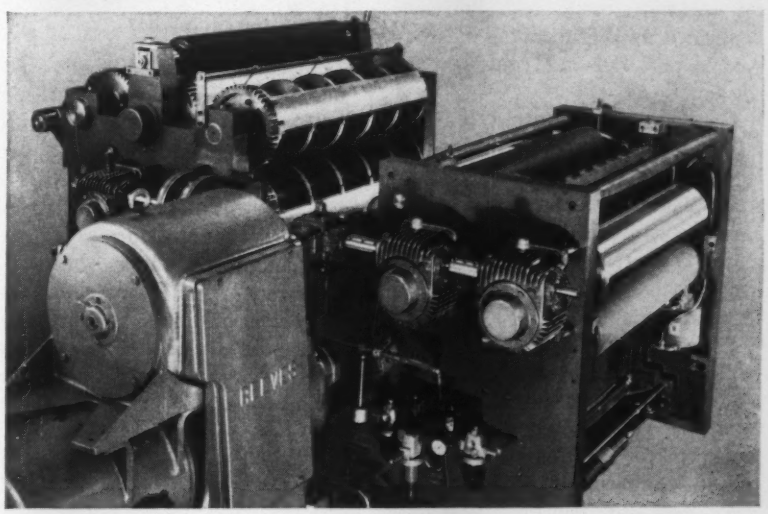

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Seasonal Weakness Hits the Market

The scrap market shows definite signs of weakness this week. But it still appears to be seasonal.

Most dealers say late August and September should bring an upswing.

■ Further signs of weakness crept into the scrap market this week. But it still appears to be a seasonal weakness rather than any unexpected trend. Mills are shut down or operating at reduced levels during the vacation season and domestic demand is missing from the market. And export demand continues to slacken.

One of the big reasons for the failure of prices to drop drastically is the reduced scrap generation. Auto plants, for example, are preparing for model changeovers. In many key areas this has given a firmness to the market in spite of reduced demand.

Prices of No. 1 grades dropped in Pittsburgh this week. Some Cincinnati and Chicago prices also fell. And the West Coast market has weakened.

But scrapmen remain optimistic. They generally feel the weakness will disappear in late July with an upswing due in August. Most dealers look for big gains — with stronger export interest—in September.

The IRON AGE composite price for No. 1 heavy melting dropped again this week from $37.17 to $36.83. The composite price for No. 2 bundles remains unchanged at $24.17.

Pittsburgh—Prices moved erratically in a thin market this week. On a local list, automotive bundles went for $1 to $2 over last month. The small tonnage involved was a factor in this rise. Brokers feel the price paid might indicate spot demand rather than general strength. This thinking is backed up by the behavior of dealer grades. A mill on the fringe of the district came out initially with a price of $37 to the dealer for No. 1 heavy melting. However, the price quickly dropped to $36. There is no demand for No. 2 heavy melting, and practically none for No. 2 bundles.

Chicago — Despite feeling that factory bundles would hold, the grade slipped again as new factory lists brought prices about $1.50 off levels established last week. Dealer resistance to lower prices, however, continues to be fairly firm. And material continues to move to the mills on existing orders at stronger prices. The result has been to cut scrap movement. July volume is expected to be low. Yard inventories are still at a low level.

Philadelphia — There have been small sales of No. 1 dealer grades this week. But the sales were made at current levels. Most scrapmen in this area look for a quiet July but increased domestic interest by August.

New York — There's no basic change in either tone or prices in this market. But some dealers are becoming apprehensive.

Detroit — The market remains steady following July industrial trading. No. 1 bundles strengthened some. But secondary grades show a weakening tendency. Export interest is low. In spite of all this, the market is holding up well because so little scrap is being offered. July and August will be low months for scrap generation because auto plants are closed down for the model changeovers.

Cleveland—Most prices are holding firm. On a local list, automotive bundles moved up sharply bringing more than $2 over last month's price. Brokers say the rise reflects limited demand for a limited quantity of good scrap.

Cincinnati—The market is generally holding steady. New prices at one mill are unchanged for No. 1 grades. No. 2 heavy melting is down $1. Dealers are resisting attempts to buy at these levels. One mill indicates it won't be buying this month.

St. Louis—The market remains in summer doldrums. Activity is fair to slow and not much is expected for the next few weeks. Export demand is down temporarily.

Birmingham — Vacations have started at some plants and the scrap market appears weakening. But prices are still unchanged. Both dealers and brokers look for little price change in the next month or two.

Buffalo — The market is quiet. Dealers don't foresee any price improvement through July or early August.

Boston—As usual, the market is very quiet. Export and domestic activity is almost nil. It will probably be fall before a pickup comes.

West Coast — Prices weakened due to vacation schedules and the normal summer slowdown. Domestic mills are buying limited tonnage. Exporting to Japan is still active.

Houston—Signs of weakness are apparent. Brokers are talking about lower prices as the export outlook dims for the scrapmen.

SCRAP PRICES *(Effective June 30, 1961)*

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Pittsburgh

No. 1 hvy. melting	$35.00 to $36.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	43.00 to 44.00
No. 2 bundles	24.00 to 25.00
No. 1 busheling	35.00 to 36.00
Machine shop turn.	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Cast iron borings	18.00 to 19.00
Low phos. punch'gs plate	41.00 to 42.00
Heavy turnings	30.00 to 31.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	46.00 to 47.00
Rails, 2 ft and under	50.00 to 51.00
RR specialties	43.00 to 44.00
No. 1 machinery cast.	45.00 to 46.00
Cupola cast.	37.00 to 38.00
Heavy breakable cast.	33.00 to 34.00
Stainless	
18-8 bundles and solids	185.00 to 190.00
18-8 turnings	110.00 to 115.00
430 bundles and solids	85.00 to 90.00
410 turnings	55.00 to 60.00

Chicago

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	30.00 to 31.00
No. 1 dealer bundles	36.00 to 37.00
No. 1 factory bundles	41.00 to 42.00
No. 2 bundles	22.00 to 23.00
No. 1 busheling	36.00 to 37.00
Machine shop turn.	15.00 to 16.00
Mixed bor. and turn.	17.00 to 18.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	17.00 to 18.00
Low phos. forge crops	44.00 to 45.00
Low phos. punch'gs plate, ¼ in. and heavier	44.00 to 45.00
Low phos. 2 ft and under	41.00 to 42.00
No. 1 RR hvy. melting	40.00 to 41.00
Scrap rails, random lgth.	46.00 to 47.00
Rerolling rails	58.00 to 60.00
Rails 2 ft and under	48.00 to 49.00
Angles and splice bars	44.00 to 45.00
RR steel car axles	58.00 to 59.00
RR couplers and knuckles	43.00 to 44.00
No. 1 machinery cast.	48.00 to 49.00
Cupola cast.	42.00 to 43.00
Cast iron wheels	34.00 to 35.00
Malleable	46.00 to 47.00
Stove plate	36.00 to 38.00
Steel car wheels	42.00 to 43.00
Stainless	
18-8 bundles and solids	180.00 to 185.00
18-8 turnings	105.00 to 110.00
430 bundles and solids	90.00 to 95.00
430 turnings	50.00 to 55.00

Philadelphia Area

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	34.00 to 35.00
No. 1 dealer bundles	42.00 to 43.00
No. 2 bundles	25.00 to 26.00
No. 1 busheling	42.00 to 43.00
Machine shop turn.	13.00 to 14.00
Mixed bor. short turn.	16.00 to 17.00
Cast iron borings	14.00 to 15.00
Shoveling turnings	19.00 to 20.00
Clean cast. chem. borings	26.00 to 27.00
Low phos. 5 ft and under	42.00 to 43.00
Low phos. 2 ft punch'gs	44.00 to 45.00
Elec. furnace bundles	43.00 to 44.00
Heavy turnings	27.00 to 28.00
RR specialties	42.00 to 43.00
Rails, 18 in. and under	52.00 to 54.00
Cupola cast.	39.00 to 40.00
Heavy breakable cast.	39.00 to 40.00
Cast iron car wheels	40.50 to 41.50
Malleable	48.00 to 49.00
No. 1 machinery cast.	49.00 to 50.00

Cincinnati

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$32.00 to $33.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	33.00 to 34.00
No. 2 bundles	20.00 to 21.00
Machine shop turn.	9.00 to 10.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	13.00 to 14.00
Low phos. 18 in. and under	39.00 to 40.00
Rails, random length	42.00 to 43.00
Rails, 18 in. and under	46.00 to 47.00
No. 1 cupola cast.	33.00 to 34.00
Heavy breakable cast.	30.00 to 31.00
Drop broken cast.	44.00 to 45.00

Youngstown

No. 1 hvy. melting	$38.00 to $39.00
No. 2 hvy. melting	27.50 to 28.50
No. 1 dealer bundles	38.00 to 39.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	15.00 to 16.00
Shoveling turnings	18.00 to 19.00
Low phos. plate	40.00 to 41.00

Cleveland

No. 1 hvy. melting	$34.50 to $35.50
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	34.50 to 35.50
No. 1 factory bundles	41.50 to 42.50
No. 2 bundles	22.50 to 23.50
No. 1 busheling	34.50 to 35.50
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	16.00 to 17.00
Shoveling turnings	16.00 to 17.00
Cast iron borings	16.00 to 17.00
Cut structural & plates, 2 ft & under	39.50 to 40.50
Low pros. punch'gs plate	35.50 to 36.50
Drop forge flashings	34.50 to 35.50
Foundry steel, 2 ft & under	34.00 to 35.00
No. 1 RR hvy. melting	39.00 to 40.00
Rails 2 ft and under	49.00 to 50.00
Rails 18 in. and under	49.00 to 50.00
Steel axle turnings	27.00 to 28.00
Railroad cast.	48.00 to 49.00
No. 1 machinery cast.	48.00 to 49.00
Stove plate	39.00 to 40.00
Malleable	51.00 to 52.00
Stainless	
18-8 bundles	170.00 to 175.00
18-8 turnings	100.00 to 105.00
430 bundles	70.00 to 75.00

Buffalo

No. 1 hvy. melting	$31.00 to $32.00
No. 2 hvy. melting	26.00 to 27.00
No. 1 busheling	31.00 to 32.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	24.00 to 25.00
Machine shop turn.	13.00 to 14.00
Mixed bor. and turn.	14.00 to 15.00
Shoveling turnings	17.00 to 18.00
Cast iron borings	15.00 to 16.00
Low phos. plate	37.00 to 38.00
Structurals and plate, 2 ft and under	39.00 to 40.00
Scrap rails, random lgth.	38.00 to 39.00
Rails 2 ft and under	48.00 to 49.00
No. 1 machinery cast.	43.00 to 44.00
No. 1 cupola cast.	37.00 to 38.00

St. Louis

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
Foundry steel, 2 ft	31.00 to 32.00
No. 1 dealer bundles	34.00 to 35.00
No. 2 bundles	23.00 to 24.00
Machine shop turn.	12.50 to 13.50
Shoveling turnings	14.50 to 15.50
Cast iron borings	21.00 to 22.00
No. 1 RR hvy. melting	37.00 to 38.00
Rails, random lengths	39.00 to 40.00
Rails, 18 in. and under	44.00 to 45.00
RR specialties	40.00 to 41.00
Cupola cast.	38.00 to 39.00
Heavy breakable cast.	32.00 to 33.00
Stove plate	32.00 to 33.00
Cast iron car wheels	34.00 to 35.00
Rerolling rails	55.00 to 56.00
Unstripped motor blocks	34.00 to 35.00

Birmingham

No. 1 hvy. melting	$36.00 to $37.00
No. 2 hvy. melting	29.00 to 30.00
No. 1 dealer bundles	36.00 to 37.00
No. 2 bundles	20.00 to 21.00
No. 1 busheling	38.00 to 39.00
Machine shop turn.	18.00 to 19.00
Shoveling turnings	20.00 to 21.00
Cast iron borings	10.00 to 11.00
Electric furnace bundles	38.00 to 39.00
Elec. furnace, 3 ft & under	36.00 to 37.00
Bar crops and plate	43.50 to 44.50
Structural and plate, 2 ft.	42.50 to 43.50
No. 1 RR hvy. melting	38.00 to 39.00
Scrap rail, random lgth.	41.00 to 42.00
Rails, 18 in. and under	46.00 to 47.00
Angles and splice bars	44.00 to 45.00
No. 1 cupola cast.	42.00 to 43.00
Stove plate	42.00 to 43.00
Cast iron car wheels	34.00 to 35.00
Unstripped motor blocks	31.00 to 32.00

New York

Brokers buying prices per gross ton on cars.

No. 1 hvy. melting	$30.00 to $31.00
No. 2 hvy. melting	24.00 to 25.00
No. 2 dealer bundles	18.00 to 19.00
Machine shop turnings	5.00 to 6.00
Mixed bor. and turn.	5.00 to 6.00
Shoveling turnings	7.00 to 8.00
Clean cast. chem. borings	19.00 to 20.00
No. 1 machinery cast.	38.00 to 39.00
Mixed yard cast.	34.00 to 35.00
Heavy breakable cast.	32.00 to 33.00
Stainless	
18-8 prepared solids	160.00 to 165.00
18-8 turnings	80.00 to 85.00
430 prepared solids	65.00 to 70.00
430 turnings	20.00 to 25.00

Detroit

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$33.00 to $34.00
No. 2 hvy. melting	28.00 to 29.00
No. 1 dealer bundles	35.00 to 36.00
No. 2 bundles	21.00 to 22.00
No. 1 busheling	32.00 to 33.00
Drop forge flashings	32.00 to 33.00
Machine shop turn.	10.00 to 11.00
Mixed bor. and turn.	12.00 to 13.00
Shoveling turnings	13.00 to 14.00
Cast iron borings	12.00 to 13.00
Heavy breakable cast.	28.00 to 29.00
Mixed cupola cast.	31.00 to 32.00
Automotive cast.	40.00 to 41.00
Stainless	
18-8 bundles and solids	170.00 to 175.00
18-8 turnings	70.00 to 75.00
430 bundles and solids	70.00 to 75.00

Boston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$29.00 to $30.00
No. 2 hvy. melting	24.00 to 25.00
No. 1 dealer bundles	31.00 to 32.00
No. 2 bundles	17.00 to 18.00
No. 1 busheling	31.00 to 32.00
Machine shop turn.	4.00 to 4.50
Shoveling turnings	8.50 to 9.00
Clean cast. Chem. borings	14.50 to 15.50
No. 1 machinery cast.	39.00 to 40.00
Mixed cupola cast.	31.50 to 32.00
Heavy breakable cast.	28.00 to 28.50

San Francisco

No. 1 hvy. melting	$41.00
No. 2 hvy. melting	38.00
No. 1 dealer bundles	28.00
No. 2 bundles	25.00
Machine shop turn.	$16.00 to 17.00
Cast iron borings	16.00 to 17.00
No. 1 cupola cast.	45.00 to 46.00

Los Angeles

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	37.00
No. 1 dealer bundles	28.00
No. 2 bundles	25.00
Machine shop turn.	15.00
Shoveling turnings	15.00
Cast iron borings	15.00
Elec. furnace 1 ft and under (foundry)	50.00
No. 1 cupola cast.	46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	$25.00 to 26.00
No. 1 cupola cast.	36.00
Mixed yard cast.	31.00

Hamilton, Ont.

Brokers buying prices per net ton on cars:

No. 1 hvy. melting	$31.00
No. 2 hvy. melting cut 3 ft and under	28.00
No. 1 dealer bundles	31.00
No. 2 bundles	21.00
Mixed steel scrap	23.00
Bush., new fact., prep'd	31.00
Bush., new fact., unprep'd.	25.00
Machine shop turn.	8.00
Short steel turn.	12.00
Mixed bor. and turn.	12.00
Cast scrap	32.00

Houston

Brokers buying prices per gross ton on cars:

No. 1 hvy. melting	$35.00
No. 2 hvy. melting	31.00
No. 2 bundles	24.00
Machine shop turn.	8.00
Shoveling turnings	11.00
Cut structural plate 2 ft & under	$45.00 to 46.00
Unstripped motor blocks	29.00 to 30.00
Cupola cast.	35.00 to 36.00
Heavy breakable cast.	29.00 to 30.00

Copper Labor Contract Signed

Bulletin—Agreement between Mine-Mill union and Kennecott averts copper strike.

Pact cost about 10c per hour. American Metal Climax also settles a day after old pact's expiration last week.

■ There are good indications that Kennecott Copper Co. will reach agreement with major labor unions this year without a repetition of the record strike two years ago.

The company's contract with International Union of Mine, Mill & Smelter Workers expired June 30. Contract with United Steelworkers of America expires July 31.

Studying Offers — It's still too early to assess the Steelworkers' situation. Both sides are studying counter offers. They are scheduled to meet again July 18.

And as the deadline neared for a Mine, Mill contract, talk of a strike faded. Workers stayed on the job. And negotiations were to continue on a day-to-day basis, until other negotiations with the Steelworkers started to take shape.

Different Mood—One source contacted at Salt Lake City said, "The mood of the meetings between Mine, Mill and Kennecott has been a lot different from last time. In fact, I would say union reaction to the company's offer was not unfavorable."

The company totals its package offering at over 10¢. This would be a 7¢-per-hour pay hike, 0.25¢ increment between job classifications, and further reduction of the pay differential between operations at Arizona and New Mexico, and higher-paid Nevada.

Union Demands—Mine, Mill has asked for 8½¢-per-hour wage hike, and complete balance of wage scales at Arizona, New Mexico and Nevada. It is apparently satisfied with the 0.25¢ increment.

One union official has called Kennecott's price tag of 10¢ on its offer inflated. He also claims the company refuses to discuss job security and automation, "and wants to curtail existing hospital and medical benefits to retired employees."

One-Year Pact—The union and company are seemingly agreed on one point, a one-year contract.

Other factors are behind the general optimism.

Mine, Mill apparently has not taken a strike vote. It is usual for union leaders to get approval from the membership to call a strike, before or early in contract talks. This is used as a weapon at the bargaining table.

This can still be done in a hurry. But possibly non-action by union leaders is indicative of their thinking.

Deadline Shelved—Early in the sessions, one official said his union would not strike if a new contract was not signed by the deadline. This came from Verne Curtis, official Kennecott Council Coordinator, considered chief negotiator for Mine, Mill.

Other union leaders took him to task for this. They billed his statement as "opinion," not an official statement. Other leaders probably agreed with Mr. Curtis, but it was thought bad strategy to announce this stand.

Another Factor — Other major copper producers have three-year contracts which don't expire until next year. Under these contracts, there will be wage hikes this year at Phelps Dodge, Anaconda, and American Smelting & Refining Co.

These hikes will be hanging over the Kennecott talks. Kennecott is not eager to give more than its competitors. The unions won't settle for less.

Nickel

International Nickel Co. is raising the price of nickel in the U. S. by 7.25¢ per lb to 81.25¢ per lb. It is the first change in the nickel price since December, 1956.

Although Inco's major market is the steel industry, sales did not sag badly last year due to booming European exports. But the company notes that all of its costs are rising. And it has invested huge sums in a major new operation at Thompson Lake, Canada.

Tin Prices for the Week

June 27—119.50; June 28—119.75; June 29—118.00; June 30—117.875*.

* Estimate.

Primary Prices

(cents per lb.)	current price	last price	date of change
Aluminum Ingot	26.00	24.70	12/17/59
Copper (E)	31.00	30.00	5/16/61
Copper (CS)	31.00	30.00	5/17/61
Copper (L)	31.00	30.00	5/17/61
Lead, St. L.	10.80	11.80	12/13/60
Lead, N. Y.	11.00	12.00	12/13/60
Magnesium Ingot	36.00	34.50	8/13/56
Magnesium pig	35.25	33.75	8/13/56
Nickel	81.25	74.00	6/30/61
Titanium sponge	150-160	162-182	8/1/59
Zinc, E. St. L.	11.50	12.50	1/12/61
Zinc, N. Y.	12.00	13.00	1/12/61

ALUMINUM: 99% Ingot. COPPER: (E) = electrolytic, (CS) = custom smelters, electrolytic. (L) = lake. LEAD: common grade. MAGNESIUM: 99.8% pig Velasco, Tex. NICKEL: Port Colborne, Canada. ZINC: prime western. Other primary prices, pg. 121.

MILL PRODUCTS

(Cents per lb unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. customer's plant)

Flat Sheet (Mill Finish and Plate)

("F" temper except 6061-0)

Alloy	.030-.038	.048-.061	.077-.096	.136-.250
1100, 3003	48.4	47.4	46.4	45.4
5052	55.8	53.0	50.8	49.2
6061-0	53.0	50.3	48.4	47.0

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
1-17	45.3-46.8	54.0-61.8
18-32	45.8-47.5	58.6-81.5
33-38	49.5-52.2	85.1-96.6
39-44	59.8-63.6	102.0-124.0

Screw Machine Stock—2011-T-3

Size"	7/32-5/16	11/32-23/32	3/4-1 1/16	1 3/32-1 3/4
Price	60.0	59.2	57.7	55.8

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length"→	72	96	120	144
.019 gage	$1.506	$2.013	$2.515	$3.017

MAGNESIUM

(F.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type↓ Gage→	.250 3.00	.250-2.00	.188	.081	.032
AZ31B Stand. Grade	.....	67.9	69.0	77.9	103.1
AZ31B Spec.	.....	93.3	96.9	108.7	171.3
Tread Plate	.....	70.6	71.7	.....	.....
Tooling Plate	73.0	.....	.....	.....	.....

Extruded Shapes

factor→	6-8	12-14	24-26	36-38
Comm. Grade. (AZ31C)	65.3	65.3	66.1	71.5
Spec. Grade... (AZ31B)	84.6	85.7	90.6	104.2

Alloy Ingot

AZ91B (Die Casting)..... 37.25 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 40.75 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	138	120	138
Strip, CR	124	108	138
Rod, bar, HR	107	89	109
Angles, HR	107	89	109
Plates, HR	130	110	126
Seamless tube	157	129	200
Shot, blocks	...	87	...

COPPER, BRASS, BRONZE

(Freight included in 5000 lbs)

	Sheet	Wire	Rod	Tube
Copper	56.13	.....	53.61	57.33
Brass, Yellow	49.27	49.56	49.21	53.46
Brass, Low	52.15	52.44	52.09	56.21
Brass, Red	53.17	53.46	53.11	57.33
Brass, Naval	53.94	60.25	47.75	58.16
Munts Metal	51.94	.....	47.25	.....
Comm. Bs.	54.73	55.02	54.67	58.34
Mang. Bs.	57.71	61.54	51.27	.....
Phos. Bs. 5%	76.97	76.73	77.47	78.90

Free Cutting Brass Rod..... 34.77

TITANIUM

(Base Prices f.o.b. mill)

Sheet and strip, commercially pure, $6.75-$13.00; alloy, $13.40-$17. Plate, HR, commercially pure, $5.25-$9.00; alloy, $8.00-$10.00. Wire, rolled and/or drawn, commercially pure, $5.55-$6.05; alloy, $5.55-$9.00; bar, HR or forged, commercially pure, $4.00-$4.50; alloy, $4.00-$6.25; billets, HR, commercially pure, $3.20-$3.70; alloy, $3.20-$4.75.

PRIMARY METAL

(Cents per lb unless otherwise noted)

Antimony, American, Laredo, Tex.. 32.50
Beryllium Aluminum 5% Be, Dollars per lb contained Be $65.00
Beryllium copper, per lb conta'd Be. $43.00
Beryllium 97% lump or beads, f.o.b. Cleveland, Reading $70.00
Bismuth, ton lots ..... $ 2.25
Cadmium, del'd ..... $ 1.70
Calcium, 99.9% small lots ..... $ 4.55
Chromium, 99.8% metallic base .... $ 1.31
Cobalt, 97-99% (per lb) ..$1.50 to $ 1.57
Germanium, per gm, f.o.b. Miami, Okla., refined ..... $29.95 to $36.95
Gold, U. S. Treas., per troy oz.... $35.00
Indium, 99.9% dollars per troy oz..$ 2.25
Iridium, dollars per troy oz. ....$75 to $85
Lithium, 98% ..... $9.00 to $12.00
Magnesium sticks, 10,000 lb. 57.00
Mercury dollars per 76-lb flask f.o.b. New York ..... $197 to $200
Nickel oxide sinter at Buffalo, N. Y. or other U. S. points of entry, contained nickel 69.60
Palladium, dollars per troy oz..$24 to $26
Platinum, dollars per troy oz. .$82 to $85
Rhodium ..... $137 to $140
Silver ingots (¢ per troy oz.) 91.375
Thorium, per kg $43.00
Vanadium ..... $ 3.65
Zirconium sponge ..... $ 5.00

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5 ingot
- No. 115 ..... 32.00
- No. 120 ..... 31.25
- No. 123 ..... 30.50

80-10-10 ingot
- No. 305 ..... 36.00
- No. 315 ..... 33.75

88-10-2 ingot
- No. 210 ..... 43.75
- No. 215 ..... 40.50
- No. 245 ..... 35.75

Yellow ingot
- No. 405 ..... 27.50

Manganese bronze
- No. 420 ..... 30.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
- 0.30 copper max. 23.75-24.25
- 0.60 copper max. 23.50-24.00

Piston alloys (No. 132 type)..25.00-26.00
No. 12 alum. (No. 2 grade) ...21.75-22.25
108 alloy 22.25-22.75
195 alloy 24.75-25.75
13 alloy (0.60 copper max.)...23.50-24.00
AXS-679 (1 pct zinc) 22.00-23.00

Steel deoxidizing aluminum notch bar granulated or shot

Grade 1—95-97½% 23.25-24.25
Grade 2—92-95% 22.00-23.00
Grade 3—90-92% 21.00-22.00
Grade 4—85-90% 20.00-21.00

SCRAP METAL

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	27	26¼
Yellow brass	20⅜	18½
Red brass	23⅞	23⅛
Comm. bronze	24⅜	24
Mang. bronze	19¼	18½
Free cutting rod ends	19½	

Customs Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 27¾
- No. 2 copper wire 25¾
- Light copper 23½
- *Refining brass 24½
- Copper bearing material 23½

*Dry Copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

- No. 1 copper wire 27¾
- No. 2 copper wire 25¾
- Light copper 23½
- No. 1 composition 23
- No. 1 comp. turnings 22½
- Hvy yellow brass solids 18
- Brass pipe 16½
- Radiators 19

Aluminum

- Mixed old cast. ..... 12½—13
- Mixed new clips ..... 14½—15
- Mixed turnings, dry ..... 13½—14

Dealers' Scrap

(Dealers' buying price f.o.b. New York in cents per pound)

Copper and Brass

- No. 1 copper wire ..... 24¼—24¾
- No. 2 copper wire ..... 22¼—22¾
- Light copper ..... 19¾—20¼
- Auto radiators (unsweated). 16 —16½
- No. 1 composition ..... 20½—21
- No. 1 composition turnings.. 20 —20½
- Cocks and faucets ..... 16½—17
- Clean heavy yellow brass ... 14¼—14¾
- Brass pipe ..... 16½—17
- New soft brass clippings .... 18 —18½
- No. 1 brass rod turnings .... 16½—17

Aluminum

- Alum. pistons and struts .... 7 — 7½
- Aluminum crankcase ..... 9½—10
- 1100 (2s) aluminum clippings 12¼—12¾
- Old sheet and utensils ..... 9½—10
- Borings and turnings ..... 4½— 5
- Industrial castings ..... 10 —10½
- 2020 (24s) clippings ..... 11 —11½

Zinc

- New zinc clippings ..... 5 — 5¼
- Old zinc ..... 3 — 3¼
- Zinc routings ..... 1¾— 2
- Old die cast scrap ..... 1¾— 2

Nickel and Monel

- Pure nickel clippings 52-54
- Clean nickel turnings 40
- Nickel anodes 52-54
- Nickel rod ends 52-54
- New Monel clippings 23-23.50
- Clean Monel turnings 16.50-17
- Old sheet Monel 22-23
- Nickel silver clippings, mixed. 18
- Nickel silver turnings, mixed. 15

Lead

- Soft scrap lead ..... 7¼— 7¾
- Battery plates (dry) ..... 3 — 3¼
- Batteries, acid free ..... 2 — 2¼

Miscellaneous

- Block tin ..... 85 —87
- No. 1 pewter ..... 64 —65
- Auto babbitt ..... 46 —47
- Mixed common babbitt ..... 10 —10½
- Solder joints ..... 15 —15½
- Small foundry type ..... 9 — 9½
- Monotype ..... 9¼— 9¾
- Lino. and stereotype ..... 8½— 8¾
- Electrotype ..... 8 — 8¼
- Hand picked type shells .... 5¾— 6¼
- Lino and stereo. dross ..... 1¾— 2¼
- Electro dross ..... 2½— 3

(Effective June 30, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES, STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$119.00 *B3*		5.55 *B3*	8.10 *B3*	5.55 *B5*						
	Buffalo, N. Y.	$80.00 *R3, B3*	$99.50 *R3, B3*	$119.00 *R3, B3*	6.50 *B3*	5.55 *B3*	8.10 *B3*	5.55 *B3*	5.10 *B3,*	7.425 *S10, R7*	7.575 *B3*			
	Phila., Pa.									7.875 *P15*				
	Harrison, N. J.													15.55 *C11*
	Conshohocken, Pa.		$99.50 *A2*	$121.00 *A2*					5.15 *A2*		7.575 *A2*			
	New Bedford, Mass.									7.875 *R6*				
	Johnstown, Pa.	$80.00 *B3*	$99.50 *B3*	$119.00 *B3*		5.55 *B3*	8.10 *B3*							
	Boston, Mass.									7.975 *T8*				15.90 *T8*
	New Haven, Conn.									7.875 *D1*				
	Baltimore, Md.									7.425 *T8*				15.90 *T8*
	Phoenixville, Pa.					5.55 *P2*	8.10 *P2*	5.55 *P2*						
	Sparrows Pt., Md.								5.10 *B3*		7.575 *B3*			
	New Britain, Wallingford, Conn.			$119.00 *N8*						7.875 *W1,S7*				
	Pawtucket, R. I. Worcester, Mass.									7.975 *N7, A5*				15.90 *N7* 15.70 *T8*
MIDDLE WEST	Alton, Ill.								5.30 *L1*					
	Ashland, Ky.								5.10 *A7*		7.575 *A7*			
	Canton-Massillon, Dover, Ohio		$102.00 *R3*	$119.00 *R3, T5*						7.425 *G4*		10.80 *G4*		
	Chicago, Franklin Park, Evanston, Ill.	$80.00 *U1, R3*	$99.50 *U1, R3,W8*	$119.00 *U1, R3,W8*	6.50 *U1*	5.50 *U1, W8,P13*	8.05 *U1, Y1,W8*	5.50 *U1*	5.10 *W8, N4,A1*	7.425 *A1,T8, M8* 7.525* *M8*	7.575 *W8*		8.40 *W8, S9,I3*	15.55 *A1, S9,G4,T8*
	Cleveland, Ohio									7.425 *A5*		10.75 *A5*	8.40 *J3*	15.60 *N7*
	Detroit, Mich.			$119.00 *R5*					5.10 *G3, M2*	7.425 *M2, S1, D1, P11, B9*	7.575 *G3*	10.80 *S1*		
	Anderson, Ind.									7.425 *G4*				
	Gary, Ind. Harbor, Indiana	$80.00 *U1*	$99.50 *U1*	$119.00 *U1, Y1*		5.50 *U1, I3, Y1*	8.05 *U1, J3*	5.50 *I3*	5.10 *U1, I3,Y1*	7.425 *Y1*	7.575 *U1, I3,Y1*	10.90 *Y1*	8.40 *U1, Y1*	
	Sterling, Ill.	$80.00 *N4*				5.50 *N4*	7.75 *N4*	5.50 *N4*	5.20 *N4*					
	Indianapolis, Ind.									7.575 *R5*				15.70 *R5*
	Newport, Ky.								5.10 *A9*				8.40 *A9*	
	Niles, Warren, Struthers, Ohio Sharon, Pa.		$99.50 *S1, C10*	$119.00 *C10,S1*		5.50 *Y1*			5.10 *R3, S1*	7.425 *R3, T4,S1*	7.575 *R3, S1*	10.80 *R3, S1*	8.40 *S1*	15.55 *S1*
	Owensboro, Ky.	$80.00 *G5*	$99.50 *G5*	$119.00 *G5*										
	Pittsburgh, Midland, Butler, Aliquippa, N. Castle, McKeesport, Pa.	$80.00 *U1, P6*	$99.50 *U1, C11,P6*	$119.00 *U1, C11,B7*	6.50 *U1*	5.50 *U1, J3*	8.05 *U1, J3*	5.50 *U1*	5.10 *P6*	7.425 *B4, M10*			8.40 *S9*	15.55 *S9* 15.60 *N7*
	Weirton, Wheeling, Follansbee, W. Va.				6.50 *U1, W3*	5.50 *W3*		5.50 *W3*	5.10 *W3*	7.425 *W5*	7.575 *W3*	10.80 *W3*		
	Youngstown, Ohio	$80.00 *R3*	$99.50 *Y1, C10*	$119.00 *Y1*			8.05 *Y1*		5.10 *U*	7.425 *Y1,R5*	7.575 *U1, Y1*	10.95 *Y1*	8.40 *U1, Y1*	15.55 *R5, Y1*
WEST	Fontana, Cal.	$90.50 *K1*	$109.00 *K1*	$140.00 *K1*		6.30 *K1*	8.85 *K1*	6.45 *K1*	5.825 *K1*	9.20 *K1*				
	Geneva, Utah		$99.50 *C7*			5.50 *C7*	8.05 *C7*							
	Kansas City, Mo.					5.60 *S2*	8.15 *S2*						8.65 *S2*	
	Los Angeles, Torrance, Cal.		$109.00 *B2*	$139.00 *B2*		6.20 *C7, B2*	8.75 *B2*		5.85 *C7, B2*	9.30 *C1,R5*			9.60 *B2*	17.75 *J3*
	Minnequa, Colo.					5.80 *C6*			6.20 *C6*	9.375 *C6*				
	Portland, Ore.					6.25 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$109.00 *B2*			6.15 *B2*	8.70 *B2*		5.85 *C7, B2*					
	Seattle, Wash.		$109.00 *B2*	$140.00 *B2*		6.25 *B2*	8.80 *B2*		6.10 *B2*					
SOUTH	Atlanta, Ga.					5.70 *A8*			5.10 *A8*					
	Fairfield, City, Ala. Birmingham, Ala.	$80.00 *T2*	$99.50 *T2*			5.50 *T2 R3,C16*	8.05 *T2*		5.10 *T2, R3,C16*		7.575 *T2*			
	Houston, Lone Star, Texas		$104.50 *S2*	$124.00 *S2*		5.60 *S2*	8.15 *S2*						8.65 *S2*	

* Electro-galvanized-plus galvanizing extras.

(Effective June 30, 1961)

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS								WIRE ROD	TINPLATE†		
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized (Hot-dipped)	Electro-galvanized	Enameling	Long Terne	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.		Cokes▲ *1.25*-lb. base box	Electro▲▲ *0.25*-lb. base box	Thin *0.25* lb. coating in coils
EAST	Buffalo, N. Y.	5.10 *B3*	6.275 *B3*					7.525 *B3*	9.275 *B3*	6.40 *W6*	†Special coated mfg. terne deduct 35¢ from 1.25-lb. coke base box price 0.75 lb. 0.25 lb. add 55¢. Can-making quality BLACKPLATE 55 to 128 lb. deduct $2.20 from 1.25 lb. coke base box. ▲ COKES: 1.50-lb. add 25¢. ▲▲ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		Prices are for 50 lb. base box; for 45 lb. deduct 15¢; for 55 lb. add 15¢; for 60 lb. add 30¢.
	Claymont, Del.												
	Coatesville, Pa.												
	Conshohocken, Pa.	5.15 *A2*	6.325 *A2*					7.575 *A2*					
	Harrisburg, Pa.												
	Hartford, Conn.												
	Johnstown, Pa.									6.40 *B3*			
	Fairless, Pa.	5.15 *U1*	6.325 *U1*					7.575 *U1*	9.325 *U1*			$9.10 *U1*	$6.25 *U1*
	New Haven, Conn.												
	Phoenixville, Pa.												
	Sparrows Pt., Md.	5.10 *B3*	6.275 *B3*	6.875 *B3*		6.775 *B3*		7.525 *B3*	9.275 *B3* 10.025 *B3**	6.50 *B3*	$10.40 *B3*	$9.10 *B3*	$6.25 *B3*
	Worcester, Mass.									6.70 *A5*			
MIDDLE WEST	Alton, Ill.									6.60 *L1*			
	Ashland, Ky.	5.10 *A7*		6.875 *A7*		6.775 *A7*		7.525 *A7*			Hollowware Enameling 29 ga.—7.85 *U1* at Gary; Pittsburgh; *J3* at Aliquippa; *W5* at Yorkville; *Y1* at Indiana Harbor; *W5* at Wheeling; 7.95 *G2* at Granite City.		
	Canton-Massillon, Dover, Canfield, Ohio			6.875 *R1, R3*	7.50 *C19*								
	Chicago, Joliet, Ill.	5.10 *W8, A1*						7.525 *U1, W8*		6.40 *A5, R3, W8*			
	Sterling, Ill.									6.50 *N4, K2*			
	Cleveland, Ohio	5.10 *R3, J3*	6.275 *R3, J3*		7.65 *R3*	6.775 *R3*		7.525 *R3, J3*	9.275 *R3, J3*	6.40 *A5*			
	Detroit, Mich.	5.10 *G3, M2*	6.275 *G3, M2*					7.525 *G3*	9.275 *G3*				
	Newport, Ky.	5.10 *A9*	6.275 *A9*										
	Gary, Ind. Harbor, Indiana	5.10 *U1, I3, Y1*	6.275 *U1, I3, Y1*	6.875 *U1, I3*		6.775 *U1, I3, Y1*	7.225 *U1*	7.525 *U1, Y1, I3*	9.275 *U1, Y1*	6.40 *Y1*	$10.40 *U1, Y1*	$9.10 *I3, U1 Y1,*	$6.25 *U1, I3*
	Granite City, Ill.	5.20 *G2*	6.375 *G2*	6.975 *G2*								$9.20 *G2*	
	Kokomo, Ind.			6.975 *C9*						6.50 *C9*			
	Mansfield, Ohio	5.10 *E2*	6.275 *E2*				7.225 *E2*						
	Middletown, Ohio		6.275 *A7*	6.875 *A7*	7.225 *A7*	6.775 *A7*	7.225 *A7*						
	Niles, Warren, Ohio Sharon, Pa.	5.10 *R3, S1*	6.275 *R3*	6.875 *R3*	7.65 *R3*	6.775 *S1*	7.225 *S1*†† *R3*	7.525 *R3, S1*	9.275 *R3*			$9.10 *R3*	
	Pittsburgh, Midland, Butler, Aliquippa, McKeesport, Pa.	5.10 *U1, J3, P6*	6.275 *U1, J3, P6*	6.875 *U1, J3*	7.50 *E3*	6.775 *U1*		7.525 *U1, J3*	9.275 *U1, J3* 10.125 *U1, J3**	6.40 *A5, J3, P6*	$10.40 *U1, J3*	$9.10 *U1, J3*	$6.25 *U1, J3*
	Portsmouth, Ohio	5.10 *P7*	6.275 *P7*							6.40 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	5.10 *W3, W5*	6.275 *W3, F3, W5*	6.875 *W3, W5*	7.50 *W3*		7.225 *W3*	7.525 *W3*	9.275 *W3*		$10.40 *W5, W3*	$9.10 *W5, W3*	$6.40 *W5*** $6.25 *W3*
	Youngstown, Ohio	5.10 *U1, Y1*	6.275 *Y1*			6.775 *Y1*		7.525 *Y1*	9.275 *Y1*	6.40 *Y1*			
WEST	Fontana, Cal.	5.825 *K1*	7.40 *K1*					8.25 *K1*	10.40 *K1*		$11.05 *K1*	$9.75 *K1*	
	Geneva, Utah	5.20 *C7*											
	Kansas City, Mo.									6.65 *S2*			
	Los Angeles, Torrance, Cal.									7.20 *B2*			
	Minnequa, Colo.									6.65 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.80 *C7*	7.225 *C7*	7.625 *C7*						7.20 *C7*	$11.05 *C7*	$9.75 *C7*	
SOUTH	Atlanta, Ga.												
	Fairfield, Ala. Alabama City, Ala.	5.10 *T2, R3*	6.275 *T2, R3*	6.875 *T2, R3*		6.775 *T2*				6.40 *T2, R3*	$10.40 *T2*	$9.10 *T2*	$6.25 *T2*
	Houston, Texas									6.65 *S2*			

* Hi Str. Low Alloy Galv. ** For 55 lb.; for 60 lb. add 15¢.

†† 7.425 at Sharon; Niles is 7.225.

(Effective June 30, 1961)

IRON AGE

STEEL PRICES

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon† Steel	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.		Listing reinforcing bar prices has been suspended. Major producers now quote prices only in response to specific inquiries.		6.725 *B3*	9.025 *B3*	8.30 *B3*					
	Buffalo, N. Y.	5.675 *R3,B3*		7.70 *B5*	6.725 *B3,R3*	9.025 *B3,B5*	8.30 *B3*	5.30 *B3*				8.00 *W6*
	Claymont, Del.							5.30 *P2*	6.375 *P2*	7.50 *P2*	7.95 *P2*	
	Coatesville, Pa.							5.30 *L4*		7.50 *L4*	7.95 *L4*	
	Conshohocken, Pa.							5.30 *A2*	6.375 *A2*	7.50 *A2*	7.95 *A2*	
	Milton, Pa.	5.825 *M7*										
	Hartford, Conn.			8.15 *R3*		9.325 *R3*						
	Johnstown, Pa.	5.675 *B3*			6.725 *B3*		8.30 *B3*	5.30 *B3*		7.50 *B3*	7.95 *B3*	8.00 *B3*
	Steelton, Pa.											
	Fairless, Pa.	5.825 *U1*										
	Newark, Camden, N. J.			8.10 *W10, P10*		9.20 *W10, P10*						
	Bridgeport, Putnam, Willimantic, Conn.			8.20 *W10* 8.15 *J3*	6.80 *N8*	9.175 *N8*						
	Sparrows Pt., Md.							5.30 *B3*		7.50 *B3*	7.95 *B3*	8.10 *B3*
	Palmer, Worcester, Readville, Mansfield, Mass.			8.20 *B5, C14*		9.325 *A5,B5*						8.30 *A5, W6*
	Spring City, Pa.			8.10 *K4*		9.20 *K4*						
MIDDLE WEST	Alton, Ill.	5.875 *L1*										8.20 *L1*
	Ashland, Newport, Ky.							5.30 *A7,A9*		7.50 *A9*	7.95 *A7*	
	Canton, Massillon, Mansfield, Ohio	6.15* *R3*		7.65 *R3,R2*	6.725 *R3, T5*	9.025 *R3,R2, T5*		5.30 *E2*				
	Chicago, Joliet, Waukegan, Madison, Harvey, Ill.	5.675 *U1,R3, W8,N4,P13*		7.65 *A5, W10,W8, B5,L2,N9*	6.725 *U1,R3, W8*	9.025 *A5, W10,W8, L2,N8,B5*	8.30 *U1,W8, R3*	5.30 *U1,A1, W8,13*	6.375 *U1*	7.50 *U1, W8*	7.95 *U1, W8*	8.00 *A5,R3, W8,N4, K2,W7*
	Cleveland, Elyria, Ohio	5.675 *R3*		7.65 *A5,C13, C18*		9.025 *A5, C13,C18*	8.30 *R3*	5.30 *R3,J3*	6.375 *J3*		7.95 *R3,J3*	8.00 *A5, C13,C18*
	Detroit, Plymouth, Mich.	5.675 *G3*		7.90 *P3* 7.85 *P8B5H2* 7.65 *R5*	6.725 *R5,G3*	9.025 *R5,P8, H2* 9.225 *B5,P3*	8.30 *G3*	5.30 *G3*		7.50 *G3*	7.95 *G3*	
	Duluth, Minn.											8.00 *A5*
	Gary, Ind. Harbor, Crawfordsville, Hammond, Ind.	5.675 *U1,I3, Y1*		7.65 *R3,J3*	6.725 *U1,I3, Y1*	9.025 *R3,M4*	8.30 *U1,Y1*	5.30 *U1,I3, Y1*	6.375 *J3, Y1*	7.50 *U1, Y1*	7.95 *U1, Y1,I3*	8.10 *M4*
	Granite City, Ill.							5.40 *G2*				
	Kokomo, Ind.											8.10 *C9*
	Sterling, Ill.	5.775 *N4*					7.925 *N4*	5.30 *N4*			7.625 *N4*	8.10 *K2*
	Niles, Warren, Ohio Sharon, Pa.			7.65 *C10*	6.725 *C10,*	9.025 *C10*		5.30 *R3,S1*		7.50 *S1*	7.95 *R3, S1*	
	Owensboro, Ky.	5.675 *G5*			6.725 *G5*							
	Pittsburgh, Midland, Donora, Aliquippa, Pa.	5.675 *U1,J3*		7.65 *A5,B4, R3,J3,C11, W10,S9,C8, M9*	6.725 *U1,J3, C11,B7*	9.025 *A5, W10,R3,S9, C11,C8,M9*	8.30 *U1,J3*	5.30 *U1,J3*	6.375 *U1,J3*	7.50 *U1, J3,B7*	7.95 *U1, J3,B7*	8.00 *A5, J3,P6*
	Portsmouth, Ohio											8.00 *P7*
	Youngstown, Steubenville, O.	5.675 *U1,R3, Y1*		7.65 *A1,Y1, F2*	6.725 *U1,Y1*	9.025 *Y1,F2*	8.30 *U1,Y1*	5.30 *U1,W5, R3,Y1*		7.50 *Y1*	7.95 *U1,Y1*	8.00 *Y1*
WEST	Emeryville, Fontana, Cal.	6.375 *K1*			7.775 *K1*		9.00 *K1*	6.10 *K1*		8.30 *K1*	8.75 *K1*	
	Geneva, Utah							5.30 *C7*			7.95 *C7*	
	Kansas City, Mo.	5.925 *S2*			6.975 *S2*		8.55 *S2*					8.25 *S2*
	Los Angeles, Torrance, Cal.	6.375 *C7,B2*		9.10 *R3,P14, S12*	7.775 *B2*	11.00 *P14, B5*	9.00 *B2*					8.95 *B2*
	Minnequa, Colo.	6.125 *C6*						6.15 *C6*				8.25 *C6*
	Portland, Ore.	6.425 *O2*										
	San Francisco, Niles, Pittsburg, Cal.	6.375 *C7* 6.425 *B2*					9.05 *B2*					8.95 *C7,C6*
	Seattle, Wash.	6.425 *B2,N6, A10*			7.825 *B2*		9.05 *B2*	6.20 *B2*		8.40 *B2*	8.85 *B2*	
SOUTH	Atlanta, Ga. Jacksonville, Fla.	5.875 *A8*										8.00 *A8* 8.35 *M4*
	Fairfield City, Ala. Birmingham, Ala.	5.675 *T2,R3, C16*		8.25 *C16*			8.30 *T2*	5.30 *T2,R3*			7.95 *T2*	8.00 *T2,R3*
	Houston, Ft. Worth, Lone Star, Texas, Sand Springs, Okla.	5.925 *S2*			6.975 *S2*		8.55 *S2*	5.40 *S2*		7.60 *S2*	8.05 *S2*	8.25 *S2*

† Merchant Quality—Special Quality 35¢ higher. (Effective June 30, 1961) * Special Quality.

STEEL PRICES

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angel Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, Ohio
A8 Atlantic Steel Co., Atlanta, Ga.
A9 Acme-Newport Steel Co., Newport, Ky.
A10 Alaska Steel Mills, Inc., Seattle, Wash.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Steel Co., Pacific Coast Div.
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brooke Plant, Wickwire-Spencer Steel Div., Birdsboro, Pa.
B7 A. M. Byers, Pittsburgh
B8 Braeburn Alloy Steel Corp., Braeburn, Pa.
B9 Barry Universal Corp., Detroit, Mich.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C18 Cold Drawn Steel Plant, Western Automatic Machine Screw Co., Elyria, O.
C19 Canfield Steel Co., Canfield, O.

D1 Detroit Steel Corp., Detroit
D2 Driver, Wilbur B., Co., Newark, N. J.
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire-Reeves Steel Corp., Mansfield, O.
E3 Enamel Products & Plating Co., McKeesport, Pa.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit
G4 Greer Steel Co., Dover, O.
G5 Green River Steel Corp., Owenboro, Ky.

H1 Hanna Furnace Corp., Detroit
H2 Hercules Drawn Steel Corp., Toledo, O.

I2 Ingersoll Steel Div., New Castle, Ind.
I3 Inland Steel Co., Chicago, Ill.
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Calif.
K2 Keystone Steel & Wire Co., Peoria
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid States Steel & Wire Co., Crawfordsville, Ind.
M7 Milton Steel Products Div., Milton, Pa.
M8 Mill Strip Products Co., Evanston, Ill.
M9 Moltrup Steel Products Co., Beaver Falls, Pa.
M10 Mill Strip Products Co., of Pa., New Castle, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Carpenter Steel of New England, Inc., Bridgeport, Conn.
N9 Nelson Steel & Wire Co.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Steel Corp., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P13 Phoenix Mfg. Co., Joliet, Ill.
P14 Pacific Tube Co.
P15 Philadelphia Steel and Wire Corp.

R1 Reeves Steel & Mfg. Div., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Jones & Laughlin Steel Corp., Stainless and Strip Div.
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Div., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Div. of Copperweld Steel Co.
S10 Seneca Steel Service, Buffalo
S11 Southern Electric Steel Co., Birmingham
S12 Sierra Drawn Div., Bliss & Laughlin, Inc., Los Angeles, Calif.
S13 Seymour Mfg. Co., Seymour, Conn.
S14 Screw and Bolt Corp. of America, Pittsburgh, Pa.

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O
T7 Texas Steel Co., Fort Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago.
W8 Wisconsin Steel Div., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

STEEL SERVICE CENTER PRICES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery Charge	Sheets			Strip	Plates	Shapes	Bars		Alloy Bars			
		Hot-Rolled (18 ga. & hvr.)	Cold-Rolled (15 gage)	Galvanized (10 gage)††	Hot-Rolled		Standard Structural	Hot-Rolled (merchant)	Cold-Finished	Hot-Rolled 4615 As rolled	Hot-Rolled 4140 Annealed	Cold-Drawn 4615 As rolled	Cold-Drawn 4140 Annealed
Atlanta		9.37	10.61	11.83	10.85	9.73	9.94	9.53	13.24	.....	.....	.....	.....
Baltimore	$.10	7.87	9.71	10.16	11.35	9.70	9.95	8.65	11.80	17.48	16.48	21.58	20.83
Birmingham		8.46	10.20	10.59	9.45	8.41	8.47	8.26	13.14	16.76	16.65	.....	.....
Boston**	.10	10.00	10.50	11.87	12.50	9.95	10.60	10.15	13.45	17.79	16.69	21.89	21.04
Buffalo**	.15	9.45	10.20	11.95	11.85	9.55	10.05	9.60	11.60	17.45	16.45	21.55	20.80
Chicago**	.15	9.37	10.35	10.85	11.54	9.21	9.72	9.37	10.80	17.10	16.10	21.20	20.45
Cincinnati**	.15	9.53	10.41	10.90	11.86	9.59	10.29	9.48	11.68	17.42	16.42	21.52	20.77
Cleveland**	.15	9.37[1]	10.81	11.07	11.66	9.45	10.11	9.69	11.40	17.21	16.21	21.31	20.56
Denver		11.55	12.53	13.03	13.72	11.39	11.90	11.55	12.98	.....	.....	.....	20.84
Detroit**	.15	9.63	10.61	11.20	11.91	9.58	10.29	9.68	11.16	17.38	16.38	21.48	20.73
Houston**		8.67	9.48	11.35[3]	10.23	7.91	8.31	8.08	13.10	17.50	16.55	21.55	20.85
Kansas City	.15	10.53	11.37	10.95	12.70	10.39	10.91	10.55	11.72	17.17	15.87	21.87	21.12
Los Angeles		10.35[1]	12.15	12.20	12.40	10.30	10.45	10.25	14.20	18.30	17.35	22.90	22.20
Memphis	.15	9.13	10.50	10.95	11.44	9.47	9.82	8.97	12.89	.....	.....	.....	.....
Milwaukee**	.15	9.51	10.49	10.99	11.68	9.35	9.94	9.51	11.04	17.24	16.24	21.24	20.49
New York**	.10	10.17	10.88	11.45	12.47	10.32	11.00	10.54	13.35	17.50	16.50	21.60	20.85
Norfolk	.20	8.20	.....	.....	8.90	8.65	9.20	8.90	10.70	.....	.....	.....	.....
Philadelphia	.10	9.90	10.10	10.76	11.35	9.70	9.95	9.75	12.05	17.48	16.48	21.58	20.83
Pittsburgh**	.15	9.37	10.81	11.83	11.64	9.21	9.72	9.37	11.40	17.10	16.10	21.20	20.45
Portland		9.45	11.30	12.35	12.40	10.55	11.00	9.45	16.65	18.60	17.85	22.70	22.15
San Francisco	.10	10.75	11.75[2]	11.95	12.80	10.90	11.20	10.65	15.20	18.30	17.35	22.90	22.20
Seattle		11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.20	18.60	18.00	22.70	22.15
Spokane	.15	11.35	12.45	13.40	12.80	10.95	11.50	10.80	16.35	17.75	17.95	21.58	22.30
St. Louis**	.15	9.57	10.73	11.23	11.74	9.43	9.95	9.59	11.43	17.48	16.48	21.58	20.83
St. Paul	.15	9.72	10.39	11.54	11.89	9.56	10.07	9.72	11.64	.....	16.69	.....	21.04

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 4999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may be combined with each other for quantity. **These cities are on order quantity pricing. Prices shown are for 2000 lb item quantities of the following: Hot-rolled sheet—10 ga. x 36 x 96—120; Cold-rolled sheet—20 ga x 36 x 96—120; Galv. sheet—10 ga x 36—120; Hot-rolled strip—¼" x 1"; Plate—¼" x 84"; Shapes—I-Beams 6 x 12.5; Hot-rolled bar—Rounds—¾-2 15/16; Cold-finished bar—C 1018—1" rounds; Alloy bar—hot-rolled 4615—1⅝" to 2¾"; cold drawn—15/16" to 2¾" round; Hot-rolled 4140—⅝" to 2¾" round, cold drawn—15/16" to 2¾" round.

†† 13c zinc. [1] Deduct for country delivery. [2] 15 ga. & heavier; [3] 14 ga. & lighter. [4] 10 ga. x 48 — 120.

(Effective June 30, 1961)

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Birdsboro, Pa. *B6*	68.00	68.50	69.00	69.50	73.00
Birmingham *R3*	62.00	62.50*	66.50	.....	.....
Birmingham *W9*	62.00	62.50*	66.50	.....	.....
Birmingham *U4*	62.00	62.50*	66.50	.....	.....
Buffalo *R3*	66.00	66.50	67.00	67.50	.....
Buffalo *H1*	66.00	66.50	67.00	67.50	71.50†
Buffalo *W6*	66.00	66.50	67.00	67.50	.....
Chester *P2*	68.00	68.50	69.00	.....	.....
Chicago *I4*	66.00	66.50	66.50	67.00	.....
Cleveland *A5*	66.00	66.50	66.50	67.00	71.00†
Cleveland *R3*	66.00	66.50	66.50	67.00	.....
Duluth *I4*	66.00	66.50	66.50	67.00	71.00†
Erie *I4*	66.00	66.50	66.50	67.00	71.00†
Fontana *K1*	75.00	75.50	.....	.....	.....
Geneva, Utah *C7*	66.00	66.50	.....	.....	.....
Granite City *G2*	67.90	68.40	68.90	.....	.....
Hubbard *Y1*	.....	.....	66.50	.....	.....
Ironton, Utah *C7*	66.00	66.50	.....	.....	.....
Lyles, Tenn. *T3*	.....	.....	.....	.....	73.00
Midland *C11*	66.00	.....	.....	.....	.....
Minnequa *C6*	68.00	68.50	69.00	.....	.....
Monessen *P6*	66.00	.....	.....	.....	.....
Neville Is. *P4*	66.00	66.50	66.50	67.00	71.00†
N. Tonawanda *T1*	.....	66.50	67.00	67.50	.....
Rockwood *T3*	62.00	62.50	66.50	67.00	73.00
Sharpsville *S3*	66.00	.....	66.50	67.00	.....
So. Chicago *R3*	66.00	66.50	66.50	67.00	.....
So. Chicago *W8*	66.00	.....	66.50	67.00	.....
Swedeland *A2*	68.00	68.50	69.00	69.50	71.00†
Toledo *I4*	66.00	66.50	66.50	67.00	.....
Troy, N. Y. *R3*	68.00	68.50	69.00	69.50	73.00
Youngstown *Y1*	.....	.....	66.50	.....	.....

DIFFERENTIALS: Add, 75¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.25 pct manganese or portion thereof over 1 pct, $2 per ton for 0.50 to 0.75 pct nickel, $1 for each additional 0.25 pct nickel.

Add $1.00 for 0.31-0.69 pct phos. Add 50¢ per gross ton for truck loading charge.

Silvery Iron: Buffalo (6 pct), *H1*, $79.25; Jackson *J1, I4*, Toledo, *I4*, $78.00; Niagara Falls (15.01-15.50), $101.00; Keokuk (14.01-14.50), $89.00; (15.51-16.00), $92.00. Add 75¢ per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 13 pct; 13 to 13.5 pct; 13.5 to 14 pct, add $1. Add $1.00 for each 0.50 pct manganese over 1.00 pct.

† Intermediate low phos.

FASTENERS

(Base discounts, f.o.b. mill, based on latest list prices)

Hex Screws and All Bolts Including Hex & Hex, Square Machine, Carriage, Lag, Plow, Step, and Elevator

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Nuts: Hexagon and Square, Hex, Heavy Hex, Thick Hex & Square

(Discount for 1 container)	*Pct*
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

Hexagon Head Cap Screws—UNC or UNF Thread—Bright & High Carbon

(Discount for 1 container)	
Plain finish—packaged and bulk	46
Hot galvanized and zinc plated—packaged	39.25
Hot galvanized and zinc plated—bulk	46

(On all the above categories add 25 pct for less than container quantities. Minimum plating charge—$10.00 per item. Price on application assembled to bolts.)

Machine Screws and Stove Bolts

(Packages—plain finish)

	Discount Screws	Bolts
Full Cartons	46	46

Machine Screws—bulk

¼ in. diam or smaller	25,000 pcs	50
5/16, ⅜ & ½ in. diam	15,000 pcs	50

Machine Screw and Stove Bolt Nuts

(Packages—plain finish)

	Discount Hex	Square
Full Cartons	46	57
Bulk		
¼ in. diam or smaller	25,000 pcs	
5/16 or ⅜ in. diam	56	60
	15,000 pcs	
	56	60

Rivets

	Base per 100 lb
½ in. diam and larger	$12.85
	Pct Off List
7/16 in. and smaller	15

NOTE: Ferroalloy prices are published in alternate issues.

TOOL STEEL

F.o.b. mills

W	Cr	V	Mo	Co	per lb	AISI
18	4	1	—	—	$1.84	T-1
18	4	1	—	5	2.545	T-4
18	4	2	—	—	2.005	T-2
1.5	4	1.5	8	—	1.20	M-1
6	4	3	6	—	1.59	M-3
6	4	2	5	—	1.345	M-2
High-carbon chromium					.955	D-3, D-5
Oil hardened manganese					.505	O-2
Special carbon					.38	W-1
Extra carbon					.38	W-1
Regular carbon					.325	W-1

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural, delivered lower Lake ports. Interim prices for 1960 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.70
Old range, bessemer	11.85
Old range, nonbessemer	11.70
Mesabi, bessemer	11.60
Mesabi, nonbessemer	11.45
High phosphorus	11.45

(Effective June 30, 1961)

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	201	202	301	302	303	304	316	321	347	403	410	416	430
Ingots, reroll.	22.75	24.75	24.00	26.25	—	28.00	41.25	33.50	38.50	—	17.50	—	17.75
Slabs, billets	25.00	28.25	26.00	29.50	32.00	29.50	47.50	38.00	46.50	—	19.25–21.50	—	19.75–21.75
Billets, forging	—	37.75	38.75	39.50	42.50	39.50	64.50	48.75	57.75	29.25	29.25–26.75	29.75	29.75
Bars, struct.	43.50	44.50	46.00	46.75	49.75	46.75	75.75	57.50	67.25	35.00	35.00–31.50	35.50	35.50
Plates	39.25	40.00	41.25	42.25	45.00	45.75	71.75	54.75	64.75	30.00	30.00	31.25–31.75	31.00
Sheets	48.50	49.25	51.25	52.00	56.75	52.00	80.75	65.50	79.25	40.25	40.25	48.25	40.75
Strip, hot-rolled	36.00	39.00	37.25	40.50	—	40.50	68.50	53.50	63.50	—	31.00	—	32.00
Strip, cold-rolled	43.50	46.75	45.00	49.50	56.75	49.50	76.75	62.25	75.25	40.25	40.25	42.50	38.75
Wire CF; Rod HR	—	42.25	43.50	44.25	47.25	44.25	71.75	54.50	63.75	33.25	33.25–29.75	33.75	33.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11;* Brackenridge, Pa., *A3;* Butler, Pa., *A7;* Vandergrift, Pa., *U1;* Washington, Pa., *W2, J2;* Baltimore, *E1;* Middletown, O., *A7;* Massillon, O., *R3;* Gary, *U1;* Bridgeville, Pa., *U2;* New Castle, Ind., *I2;* Detroit, *M2;* Louisville, O., *R5.*

Strip: Midland, Pa., *C11;* Waukegan, Cleveland, *A5;* Carnegie, Pa., *S9;* McKeesport, Pa., *F1;* Reading, Pa., *C2;* Washington, Pa., *W2;* W. Leechburg, Pa., *A3;* Bridgeville Pa., *U2;* Detroit, *M2;* Detroit, *S1;* Canton, Massillon, O., *R3;* Harrison, N. J., *D3;* Youngstown, *R5;* Sharon, Pa., *S1;* Butler, Pa., *A7;* Wallingford, Conn., *U3* (plus further conversion extras); *W1* (25¢ per lb. higher); Seymour, Conn., *S13,* (25¢ per lb. higher); New Bedford, Mass., *R6* Gary, *U1,* (25¢ per lb. higher); Baltimore, Md., *E1* (300 series only).

Bar: Baltimore, *A7;* S. Duquesne, Pa., *U1;* Munhall, Pa., *U1;* Reading, Pa., *C2;* Titusville, Pa., *U2;* Washington, Pa., *J2;* McKeesport, Pa., *U1, F1;* Bridgeville, Pa., *U2;* Dunkirk, N. Y., *A3;* Massillon, O., *R5;* S. Chicago, *U1;* Syracuse, N. Y., *C11;* Watervliet, N. Y., *A3;* Waukegan, *A5;* Canton, O., *T5, R5;* Ft. Wayne, *I4;* Detroit, *R5;* Gary, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Ambridge, Pa., *B7.*

Wire: Waukegan, *A5;* Massillon, O., *R3;* McKeesport, Pa., *F1;* Ft. Wayne, *J4;* Newark, N. J. *D2;* Harrison, N. J., *D3;* Baltimore, *A7;* Dunkirk, *A3;* Monessen, *P1;* Syracuse, *C11;* Bridgeville, *U2;* Detroit, *R5;* Reading, Pa., *C2;* Bridgeport, Conn., *N8* (down to and including ¼").

Structurals: Baltimore, *A7;* Massillon, O., *R3;* Chicago, Ill., *J4;* Watervliet, N. Y., *A3;* Syracuse, *C11;* S. Chicago, *U1.*

Plates: Ambridge, Pa., *B7;* Baltimore, *E1;* Brackenridge, Pa., *A3;* Chicago, *U1;* Munhall, Pa., *U1;* Midland, Pa., *C11;* New Castle, Ind., *I2;* Middletown, *A7;* Washington, Pa., *J2;* Cleveland, Massillon, *R3;* Coatesville, Pa., *C15;* Vandergrift, Pa., *U1;* Gary, *U1.*

Forging billets: Ambridge Pa., *B7;* Midland, Pa., *C11;* Baltimore, *A7;* Washington, Pa., *J2;* McKeesport, *F1;* Massillon, Canton, O., *R3;* Watervliet, *A3;* Pittsburgh, Chicago, *U1;* Syracuse, *C11;* Detroit, *R5;* Munhall, Pa., S. Chicago, *U1;* Owensboro, Ky., *G5;* Bridgeport, Conn., *N8;* Reading, Pa., *C2.*

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails	Woven Wire Fence	"T" Fence Posts	Single Loop Bale Ties	Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col		
Alabama City *R3*	173	187	...	212	193	9.00	9.55
Aliquippa *J3***	173	190	...	...	190	9.00	9.675
Atlanta *A8***	173	191	...	212	197	9.00	9.75
Bartonville *K2***	175	193	183	214	199	9.10	9.85
Buffalo *W6*	.....	.....	.....	.....	.....	9.00	9.55*
Chicago *N4*	173	191	177	212	197	9.00	9.75
Chicago *R3*	.....	.....	.....	.....	.....	9.00	9.55
Chicago *W7*	173	.....	.....	.....	.....	9.00	9.55†
Cleveland *A6*	.....	.....	.....	.....	.....	.....	.....
Cleveland *A5*	.....	.....	.....	.....	.....	9.00	.....
Crawf'dav. *M4***	175	192	...	214	198	9.10	9.80
Donora Pa. *A5*	173	187	...	212	193	9.00	9.55
Duluth *A5*	173	187	177	212	193	9.00	9.55
Fairfield, Ala. *T2*	173	187	...	212	193	9.00	9.55
Galveston *D4*	9.10‡	.....	.....	.....	.....	.....	.....
Houston *S2**	178	192	...	217	198	9.25	9.80†
Jacksonville *M4*	175	192	...	214	198	9.10	9.80††
Johnstown *B3***	173	190	177	...	196	9.00	9.675
Joliet Ill. *A5*	173	187	...	212	193	9.00	9.55
Kokomo *C9**	175	189	...	214	195*	9.10	9.65*
L. Angeles *B2****	.....	.....	.....	.....	.....	9.95	10.625
Kansas City *S2**.	178	192	...	217	198*	9.25	9.80†
Minnequa *C6*	178	192	182	217	198†	9.25	9.80†
Palmer, Mass. *W6*	.....	.....	.....	.....	.....	9.30	9.85*
Pittsburg, Cal. *C7*	192	210	.....	.....	213	9.95	10.50
Rankin Pa. *A5*	173	187	.....	.....	193	9.00	9.55
So. Chicago *R3*	173	187	.....	.....	193	8.65	9.20
S. San Fran. *C6*	.....	.....	.....	236	.....	9.95	10.50
SparrowsPt. *B3***	175	.....	.....	215	198	9.10	9.775
Struthers, O. *Y1**	.....	.....	.....	.....	.....	8.65	9.20
Worcester *A5*	179	.....	.....	.....	.....	9.30	9.85
Williamsport *S5*	.....	.....	.....	.....	.....	.....	.....

* Zinc less than .10¢. *** .10¢ zinc.
** 13-13.5¢ zinc. † Plus zinc extras.
‡ Wholesalers only. †† 0.115¢ zinc.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

STANDARD T. & C.	BUTTWELD													SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.	2 In.		2½ In.		3 In.		3½–4 In.	
	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Youngstown *R3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fontana *K1*	*10.75	*26.00	*7.75	*22.00	*4.25	*17.50	*1.75	*16.75	*1.25	*15.75	*0.75	*15.25	0.75	*15.50								
Pittsburgh *J3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Alton, Ill. *L1*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Sharon *M3*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Fairless *N2*	0.25	*15.0	3.25	*11.0	6.75	*6.50	9.25	*5.75	9.75	*4.75	10.25	*4.25	11.75	*4.50								
Pittsburgh *N1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Wheeling *W5*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Wheatland *W4*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50								
Youngstown *Y1*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
Indiana Harbor *Y1*	1.25	*14.0	4.25	*10.0	7.75	*5.50	10.25	*4.75	10.75	*3.75	11.25	*3.25	12.75	*3.50								
Lorain *N2*	2.25	*13.0	5.25	*9.0	8.75	*4.50	11.25	*3.75	11.75	*2.75	12.25	*2.25	13.75	*2.50	*12.25	*27.25	*5.75	*22.50	*3.25	*20.0	*1.75	*18.50
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Youngstown *R3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Fairless *N2*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Fontana *K1*	*6.25		*2.25		0.75		1.25		1.75		2.25		2.75									
Pittsburgh *J3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Alton, Ill. *L1*	4.75	*9.0	8.75	*5.0	11.75	*0.50	12.25	*1.75	12.75	*0.75	13.25	*0.25	13.75	*1.50								
Sharon *M3*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Pittsburgh *N1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Wheeling *W5*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Wheatland *W4*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50								
Youngstown *Y1*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50
Indiana Harbor *Y1*	5.75	*8.0	9.75	*4.0	12.75	0.50	13.25	*0.75	13.75	0.25	14.25	0.75	14.75	*0.50								
Lorain *N2*	6.75	*7.0	10.75	*3.0	13.75	1.50	14.25	0.25	14.75	1.25	15.25	1.75	15.75	0.50	*10.75	*24.75	*3.25	*19.0	*0.75	*16.50	4.25	*11.50

Threads only, buttweld and seamless, 2¼ pt. higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt. higher discount.
Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2-in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 13¢ to 15¢ would lower discounts on 2½ and 3-in. pipe by 2 points; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 11.50¢ per lb.

CAST IRON WATER PIPE INDEX

Birmingham	125.8
New York	138.6
Chicago	140.0
San Francisco-L. A.	148.6

Dec. 1955, value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1, 1955, issue. Source: U. S. Pipe and Foundry Co.

COKE

Furnace, beehive (f.o.b.)	Net-Ton
Connellsville, Pa.	$14.75 to $15.50
Foundry, beehive (f.o.b.)	$18.50
Foundry oven coke	
Buffalo, del'd	$33.25
Chattanooga, Tenn.	30.80
Ironton, O., f.o.b.	30.50
Detroit, f.o.b.	32.00
New England, del'd	33.55
New Haven, f.o.b.	31.00
Kearny, N. J., f.o.b.	31.25
Philadelphia, f.o.b.	31.00
Swedeland, Pa., f.o.b.	31.00
Painesville, Ohio, f.o.b.	32.00
Erie, Pa., f.o.b.	32.00
St. Paul, f.o.b.	31.25
St Louis, f.o.b.	33.00
Birmingham, f.o.b.	30.35
Milwaukee, f.o.b.	32.00
Neville Is., Pa.	30.75

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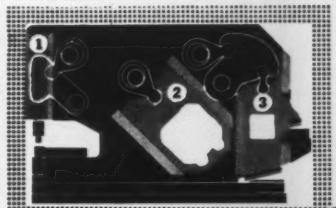
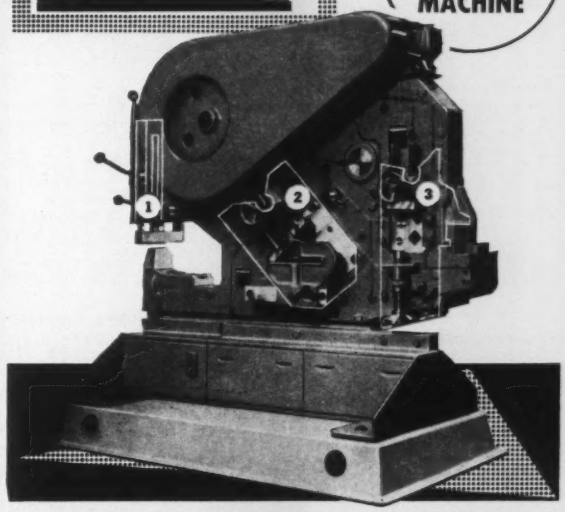


3 CLUTCH MACHINE



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FERROALLOY PRICES

NOTE: Prices of Boiler Tubes, Clad Steel, C-R Spring Steel, Electrical Sheets, Electrodes, Electroplating Supplies, Metal Powders, Rails and Track Supplies, and Refractories are published in alternate issues.

Ferrochrome

Cents per lb contained Cr, lump, bulk, carloads, del'd. 65-71% Cr, .30-1.00% max. Si.

0.02% C....	41.00	0.50% C....	33.25
0.05% C....	34.00	1.00% C....	33.00
0.10% C....	33.75	1.50% C....	32.75
0.20% C....	33.50	2.00% C....	32.50

3-5% C, 53-63% Cr, 2.5% max. Si... 26.00
4-6% C, 58-63% Cr, 3-6% Si..... 22.50
5-8% C, 58-63% Cr, 3-6% Si..... 22.50
6-8% C, 50-56% Cr, 4-7% Si..... 22.00
4.00-4.50% C, 60-70% Cr, 1.2% Si.. 28.75
0.025% C (Simplex)..... 31.50
0.010% C max, 63-66% Cr, 5-7% Si. 32.50
0.010% C max, 68-71% Cr, 2% Si max..... 31.50
0.25% C max..... 33.50

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome max. 0.10% C price schedule.

Chromium Metal

Per lb chromium, contained, packed delivered, ton lots, 97.25% min. Cr, 1% max. Fe.
0.10% max. C..... $1.29
9 to 11% C, 88-91% Cr, 0.75% Fe... 1.38

Electrolytic Chromium Metal

Per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.
Carloads..... $1.15
Ton lots..... 1.17
Less ton lots..... 1.19

Low Carbon Ferrochrome Silicon

(Cr 39-41%, Si 42-45%, C 0.05% max.)
Carloads, delivered, lump, 3-in x down, packed.
Price is sum of contained Cr and contained Si.

	Cr	Si
Carloads, bulk	22.50	14.60
Ton lots	30.45	16.05
Less ton lots	33.40	17.70

Calcium-Silicon

Per lb of alloy, lump, delivered, packed. 30-33% Cr, 60-65% Si, 3.00 max. Fe.
Carloads, bulk..... 24.00
Ton lots..... 27.95
Less ton lots..... 29.45

Calcium-Maganese—Silicon

Cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.
Carloads, bulk..... 23.00
Ton lots..... 26.15
Less ton lots..... 27.15

SMZ

Cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.
Ton lots..... 21.15
Less ton lots..... 22.40

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed max. St. Louis, V-5: 38-42% Cr, 17-19% Si, 8-11% Mn, packed.
Carload lots..... 18.45
Ton lots..... 19.95
Less ton lots..... 21.20

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.
Carload bulk..... 19.20
Ton lots to carload packed..... 21.15
Less ton lots..... 22.40

Ferromanganese

Maximum base price, f.o.b., lump size, base content 74 to 76 pct Mn. Carload lots, bulk.

	Cents per-lb
Producing Point	
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	11.00
Houston, Tex.	11.00
Johnstown, Pa.	11.00
Lynchburg, Va.	11.00
Neville Island, Pa.	11.00
Sheridan, Pa.	11.00
Philo, Ohio	11.00
Rockwood, Tenn.	11.00
S. Duquesne	11.00

Add or substract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:
Carloads, bulk..... 13.70
Ton lots packed in bags..... 16.10

Spiegeleisen

Per gross ton, lump, f.o.b., 3% Si max.

Mn	Palmerton, Pa. 10 lb, pig	35 lb, down	Neville Is., Pa. 35 lb
16-19%	$98.00	$96.00	$100.50
19-21%	100.00	98.00	102.50
21-23%	102.50	100.00	105.50

Manganese Metal

2 in. x down, cents per pound of metal delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.
Carload, packed..... 45.75
Ton lots..... 47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.
Carloads, bulk..... 34.25
Ton lots, palletized..... 36.25
250 to 1999 lb..... 39.00
Premium for Hydrogen - removed metal..... 0.75

Medium Carbon Ferromanganese

Mn 80 to 85%, C 1.25 to 1.50, Si 1.50% max., carloads, lump, bulk, delivered, per lb of contained Mn..... 24.00

Low-Carb Ferromanganese

Cents per pound Mn contained, lump size, packed, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn (Bulk)	37.15	39.95	41.15
0.07% max. C.....	35.10	37.90	39.10
0.10% max. C.....	34.35	37.15	38.35
0.15% max. C.....	31.10	33.90	35.10
0.30% max. C.....	29.80	32.60	33.80
0.50% max. C.....	28.50	31.30	32.50
0.75% max. C, 80.85% Mn, 5.0-7.0% Si...	27.00	29.80	31.00

Silicomanganese

Lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.3¢ f.o.b. shipping point.
Carloads bulk..... 11.60
Ton lots, packed..... 13.25
Carloads, bulk, delivered, per lb of briquet..... 14.00
Briquets, packed pallets, 2000 lb up to carloads..... 16.40

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct., f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $106.50 gross ton, frieght allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Cents per pound contained Si, lump size, delivered, packed.

	Ton lots,	Carloads,
98.25% Si, 0.50% Fe..	22.95	21.65
98% Si, 1.0% Fe....	21.95	20.65

Silicon Briquets

Cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si, briquets.
Carloads, bulk..... 8.00
Ton lots, packed..... 10.80

Electric Ferrosilicon

Cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si....	13.50	75% Si....	16.90
65% Si....	15.75	85% Si....	18.60
	90% Si....	20.00	

Ferrovanadium

50-55% V delivered, per pound, contained V, in any quantity.
Openhearth..... 3.20
Crucible..... 3.30
High speed steel..... 3.40

Calcium Metal

Eastern zone, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots.....	$2.05	$2.95	$3.75
100 to 1999 lb...	2.40	3.30	4.55

(Effective June 30, 1961)

Alsifer, 20% Al, 40% Si, 40% Fe, f.o.b. Suspension Bridge, N. Y. per lb.

Carloads, bulk..... 9.85¢
Ton lots..... 11.20¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo..... $1.50

Ferrocolumbium, 58-62% Cb, 2 in. x D, del'd per lb con't Cb

Ton lots..... $3.45
Less ton lots..... 3.50

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, del'd ton lots, 2-in. x D per lb con't Cb plus Ta..... $3.40

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo.. $1.76

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $5.00 unitage, per gross ton..... $120.00
10 tons to less carload..... $131.00

Ferrotitanium, 40% regular grade 0.10% C max., f.o.b. Vanadis, O., O., freight allowed, ton lots, per lb contained Ti..... $1.35
Less ton lots (200 lb and up) $1.37

Ferrotitanium, 30% low carbon, 0.10% C max., 27-32% Ti, Vanadis, O., freight allowed, per lb contained Ti, ton lots..... $1.35
Less ton lots (200 lb and up) $1.40

Ferrotitanium, 1-3% Carbon, 17-20% Ti, f.o.b. shipping point, freight allowed, carload per net ton..... $250.00
Ton lots..... $260.00

Ferrotungsten, ¼ x down packed per pounds contained W, ton lots delivered..... $2.15 (nominal)

Molybdic oxide, briquets per lb. contained Mo, f.o.b. Langeloth, Pa.....

$1.49
bags, f.o.b. Washington, Pa., Langeloth, Pa..... $1.38

Simanal, 20% Si, 20% Mn, 20% Al, f.o.b. Philo, Ohio, freight allowed per lb.

Carload, bulk lump..... 18.50¢
Ton lots, packed lump..... 20.50¢
Less ton lots..... 21.00¢

Vanadium oxide, 86-89% V_2O_5 per pound contained V_2O_5.... $1.38

Zirconium silicon, per lb of alloy

35-40% del'd, carloads, bulk.. 26.25¢
12-15%, del'd lump, bulk-carloads..... 9.25¢

Boron Agents

Borosil, per lb of alloy del. f.o.b. Philo, Ohio, freight allowed, B 3-4%, Si 40-45%, per lb contained B

2000 lb carload..... $5.50

Ferro Zirconium Boron, Zr 50% to 60%, B 0.8% to 1.0%, Si 8% max., C 8% max., Fe balance, f.o.b. Niagara Falls, New York, freight allowed, in any quantity per pound..... 30¢

Corbortam, Ti 15-21%, B 1-2%, Si 2-4%, Al 1-2%, C 4-5-7.5%, f.o.b., Suspension Bridge, N. Y., freight allowed.

Ton lots per pound..... 18.25¢

Ferroboron, 17.50 min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C, 1 in. x D, ton lots... $1.20

F.o.b. Wash., Pa., Niagara Falls, N. Y., delivered 100 lb up
10 to 14% B..... .85
14 to 19%..... 1.20
19% min. B..... 1.50

Grainal, f.o.b. Cambridge, O., freight, allowed, 100 lb & over

No. 1..... $1.05
No. 79..... 50¢

Manganese-Boron, 75.00% Mn, 17.50% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd

Ton lots (packed)..... $1.46
Less ton lots (packed)..... 1.57

Nickel-Boron, 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots..... 2.15

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AUTOMATIC, 3¾" Model A Cleveland, sgl. spdl.
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BROACHES, 10 ton 68 St. Model 10-66SRV Lapointe hyd. sgl. ram vert. surf.
DRILL, 20" No. 217 Baker Bros. box column, hy. dy.
DRILL, W. F. & John Barnes Model 420, horiz., deep hole
DRILL, 36 spdl. No. 4 BL Natco, adj. multi spdl., hyd.
DRILL, 4'-13" col. Carlton radial, MD
DRILL, 24" No. 3 Allen 3 spdl., sensitive
DRILL, 22" No. 221½ Barnes, box col., upright, new '52
DRILL, 5 spdl. Allen Mod 3VCCE, auto., 6 sta., rot'y, new '54
GEAR GEN., 12" Gleason str. bevel gear hyd.
GEAR HOBBER, 8" x 9" Model 7A Lees Bradner, '52
GEAR GEN., No. 5B Sykes or Farrel Birmingham herringbone
GRINDER, Centerless, No. 4 Cincinnati Filmatic brg.
GRINDER, Centerless, No. 12 Landis, hyd., microsphere brg.
GRINDER, Cyl., 6" x 18" Cincinnati Type ER, pl. hyd., Filmatic brg.
GRINDER, Int., No. 81 Heald Sizematic, hyd.
GRINDER, Int., Model 112DY Bryant, pl. hyd.
GRINDER, Surf., 8" x 24" No. 3S Abrasive, hard ways
GRINDER, Surf. 30" No. 16 Blanchard rot'y surf.
GRINDER, Cincinnati Monoset cutter and tool
GRINDER, Thread, 6" x 15" Model TG615 J&L auto.
GRINDER, Thread, 6" x 36" Model TG636 J&L auto. (2)
HONE, 705-2 Micromatic, 2 spdl. vert. hyd., new 55
IRONWORKER, No. 1½ Buffalo Universal cope & notching
LAPPER, No. 821-8 Micromatic "Microflat," new '53.
LATHE, Model 10x72" Sundstrand center drive auto.
LATHE, 12"x22" Model 12 Sundstrand auto. stub
LATHE, 16"x30" Monarch Type CY toolroom, hard ways
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1	1750	GE	514	600	2300/4600
1	1500	GE	720	600	6600/13200
1	1000	GE	720	275	2300/4160
1	1000	GE	900	260	4000/6600
1	1000	GE	900	600	2300/4160
1	500	GE	900	125/250	440
1	500 (New)	GE	1200	300	2300
1	500	GE	900	250	2300/4160/4160
1	300	GE	1200	275	2300/4160
1	300	GE	1200	250	440/2300
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Qu.	KW	Make	Type	Volts	RPM
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1	3000 (New)	Whse.	Enc. F.V.	525	600
2	2700	GE	Enc. S.V.	415	280
1	2250 (New)	GE	Enc. S.V.	600	200/300
1	2200	GE	MCF	600	400/500
2	2000	GE	Enc. S.V.	550	230/350
2	1750	GE	Enc. S.V.	250	175/350
1	1500	Whse.	New	600	300/700
4	1500	Whse.	New	525	600
1	1300	GE	MCF	300	200/400
1	1200	GE	MCF	600	450/600
1	1000	Whse.		500	600/2000
4	1000	GM	D-8	600	600/900
2	900	GE	MCF	250	180/360
1	850	GE	MCF	250	85/170
1	750	GE	MCF	600	120/360
2	750	GE	MCF	600	450/900
2	645	SS		300	1000
4	600	Whse.		250	275/550
5	400	GM	D-8	250	300/900

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Pittsburgh Trade Lacks Strength

Used machinery dealers in Pittsburgh generally say business isn't at a sustained level of improvement.

There was a flurry of buying earlier. But the market has now become quiet.

■ Pittsburgh used machinery dealers are still waiting for demand to show a strong, sustained improvement.

Some feel things are a little better. Others have had fairly good order flurries. But there is no general trend upward. The word "spotty" was used by two dealers in describing conditions.

A supplier of steel mill equipment is among the more optimistic. He says there has been a slight pickup in orders. But demand is following no special pattern. Sheet mills, bar mills and other standard lines attract equal attention.

The same dealer says "there is quite a little advance planning." However, he admits there is nothing yet that can be called a real spending wave. And he concedes there is no assurance of any boom in the near future.

Easing Demand — Demand for electrical equipment has eased off again, reports another dealer. For about four weeks, both orders and inquiries were flowing strongly for this dealer. Unit substations, motors and generators were all in good demand. May was the best month of the year for sales.

However, things have quieted down again for the dealer. Demand apparently is still very sensitive to the day-to-day order intake of customers. Any faltering brings spending cutbacks.

According to one explanation, plants are still holding to budgets drawn up at the bottom point of the recession. Purchasing men say it is difficult to get money. Spending is pushed up only when forced by increased plant activity and immediate needs. Any lag brings cutbacks.

Need Indicated—Tax uncertainty may be holding things back to some extent. Inquiries as well as orders were strong in May. A backlog of need was indicated. One steel mill has said specifically it is holding a large spending program back until the government's program of investment incentive is nailed down.

Electrical dealers look for intense competition to continue until there is a real market surge. At present, prices of new electrical equipment are selling for 20 pct under 1958 levels, says one dealer. This kind of cutting carries over into the used equipment field and makes price a critical factor on every job.

In the general machinery end, dealers say there is no significant change. An occasional good week will be followed by a very bad one. People are still cautious, says one dealer. He does not look for an upward move until September, when vacations and plant shutdowns are out of the way.

No Pattern—Demand follows no strong pattern in the general machinery field. Sheet metal equipment and late-model machine tools are attracting some attention. Customers are looking for low prices on tools that are almost new. This combination is hard to find.

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35/45	MD410AE	132/525	Series
33	MD408AE	126/625	Comp.
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5	MD403AE	21/700	Comp.
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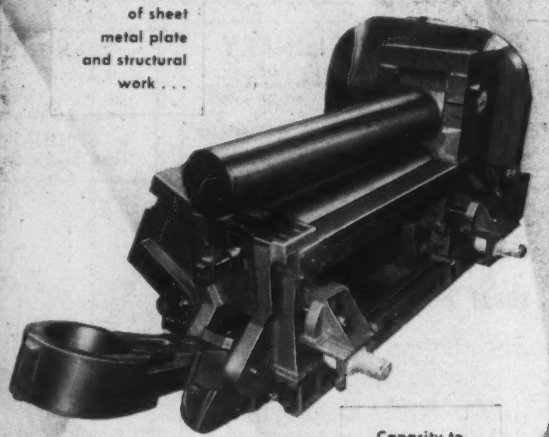

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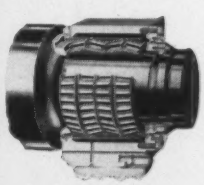

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